

Railway Recruitment Board

RRB NTPC

Non Technical Popular Categories

CBT Stage-I & II

MATHEMATICS

Sampoorna Chapter-wise

Solved Papers

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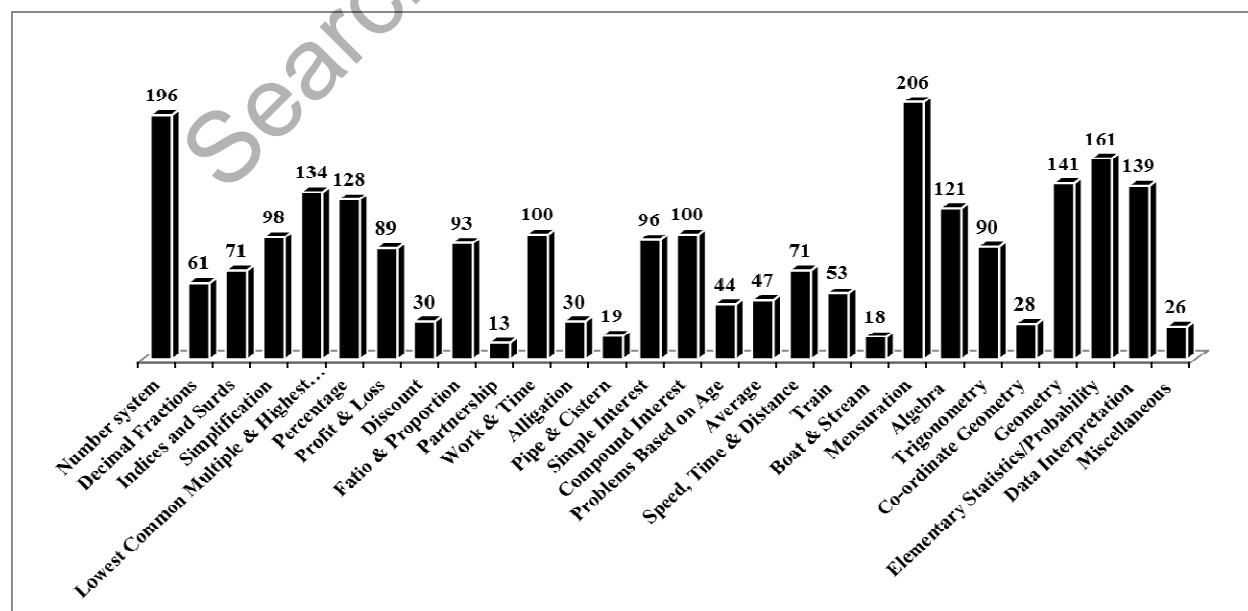
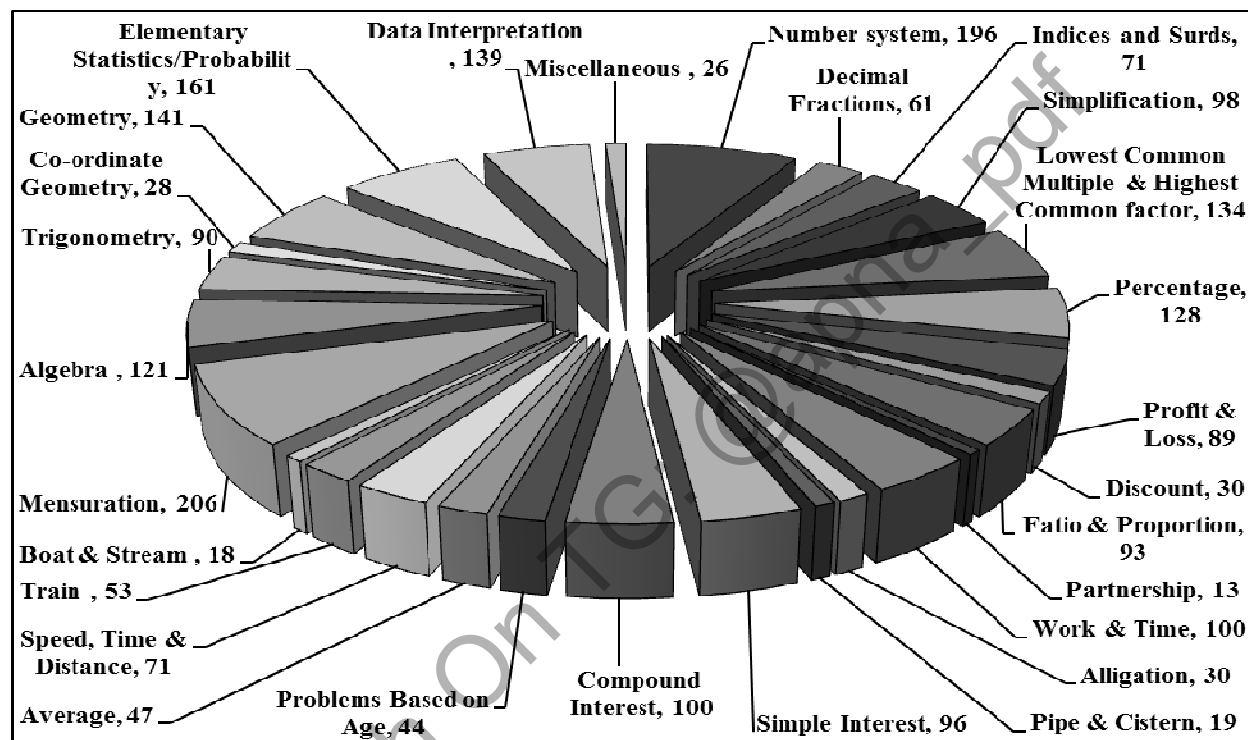
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Trend Analysis of RRB NTPC Previous Year Exams Papers Through Pie Chart and Bar Graph

S.No.	Exam Paper	Exam Date/Year	Ques. No.
1.	NTPC Stage - II	2022	15×120 = 1800
2.	NTPC Stage - I (Graduate Level & Non-Graduate Level)	2019	133×100 = 13300
3.	NTPC Stage - II	2017	9×120 = 1080
4.	NTPC Stage - I (Graduate Level & Non-Graduate Level)	2016	64×100 = 6400
			Total = 22580



Number System

Type-1 Problems Based on Divisibility

1. Which of the following numbers is divisible completely by both 9 and 11 ?

(a) 277218 (b) 10098
(c) 12345 (d) 181998

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (b) : Divisibility rule of 9 -

When the sum of the digits of a number is divisible by 9 then the number is also divisible by 9.

Divisibility rule of 11 -

When the difference between the sum of the digit in even and odd place of a number is 0 (zero) or a multiple of 11, then the number will also be divisible by 11.

From option (b),

$$1 + 0 + 0 + 9 + 8 = 18$$

i.e. 18 is divisible by 9

And

$$10098 = (9 + 0) - (8 + 0 + 1) = 9 - 9 = 0$$

Hence option (b) 10098, is divisible by both 9 and 11.

2. Which of the following numbers is NOT divisible by 9 ?

(a) 49104 (b) 77832
(c) 35253 (d) 45390

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (d) : Divisibility rule of 9 : A number whose sum of its digit is exactly divisible by 9 then the number is always divisible by 9.

from options -

(a) $49104 \rightarrow 4 + 9 + 1 + 0 + 4 = 18$, divisible by 9.

(b) $77832 \rightarrow 7 + 7 + 8 + 3 + 2 = 27$, divisible by 9.

(c) $35253 \rightarrow 3 + 5 + 2 + 5 + 3 = 18$, divisible by 9.

(d) $45390 \rightarrow 4 + 5 + 3 + 9 + 0 = 21$, not divisible by 9.

3. Which of the following number is NOT divisible by 8?

(a) 35792 (b) 35112
(c) 35412 (d) 35552

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : Divisibility rule of 8- If the last three digits of a number are divisible by 8, then the number is also completely divisible by 8.

From the given options -

(a) $35 \overline{792}$

$$\frac{792}{8} = 99 \text{ (Completely divisible)}$$

(b) $35 \overline{112}$

$$\frac{112}{8} = 14 \text{ (Completely divisible)}$$

(c) $35 \overline{412}$

$$\frac{412}{8} = 51.5 \text{ (Not completely divisible)}$$

(d) $35 \overline{552}$

$$\frac{552}{8} = 69 \text{ (Completely divisible)}$$

Hence, option (c) is not divisible by 8.

4. If the 7 digit number $504x5y3$ is divisible by 11, then one of the values of the sum of x and y is:

(a) 11 (b) 5
(c) 17 (d) 7

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (c) : Given, $504x5y3$

Divisibility rule of 11:- If the difference of the sum of digits at even place and at odd place is zero or divisible by 11 then the given number will be divisible by 11.

$$504x5y3$$

$$(0 + x + y) - (5 + 4 + 5 + 3) = 0 \text{ or multiple of 11}$$

$$x + y - 17 = 0$$

$$x + y = 17$$

Hence, Sum of x and y is 17

5. If 11-digit number $88p554085k6$, $k \neq p$, is divisible by 72, then what is the value of $(3k + 2p)$?

(a) 12 (b) 7
(c) 13 (d) 23

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (c) : Given,

$$88p554085k6 \quad \text{Where, } k \neq p$$

Note- The number which is divisible by 72 is also divisible by 8 and 9.

Divisibility rule of 8- If the last three digit of the number are divisible by 8, then the number will be divisible by 8.

Divisibility rule of 9- If the sum of the all digits of a given number is divisible by 9, then number will be divisible by 9.

In the given number $88p554085k6$

On putting, $k = 3$

$$\frac{536}{8} = 67 \text{ (Completely divisible by 8)}$$

and

On putting $p = 2$

$$\frac{8+8+2+5+5+4+0+8+5+3+6}{9}$$

$$= \frac{54}{9} = 6 \text{ (Completely divisible)}$$

Then,

$$\begin{aligned} (3k + 2p) \\ = 3 \times 3 + 2 \times 2 \\ = 13 \end{aligned}$$

6. When a number n is divided by 5, the remainder is 2. When n^2 is divided by 5, the remainder will be:

(a) 3 (b) 1
(c) 4 (d) 0

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (c) : Number = Divisor \times Quotient + Remainder

According to question,

$$n = 5 \times q + 2$$

On squaring both the sides,

$$n^2 = 25q^2 + 4 + 20q$$

On dividing by 5 –

$$\frac{n^2}{5} = 5q^2 + \frac{4}{5} + 4q$$

Hence, required remainder will be 4.

7. How many numbers of the first 100 positive integers are divisible by 3 or 4 without a remainder?

- (a) 50 (b) 5
(c) 58 (d) 85

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (a) : Total number of positive integers which is divisible by 3 = $\frac{100}{3} = 33$

Total number of positive integers which is divisible by 4 = $\frac{100}{4} = 25$

Total number of positive integers which is divisible by 12 = $\frac{100}{12} = 8$

Hence, the total number of positive integers which is divisible by 3 or 4.
= (33 + 25 – 8)
= 50

8. How many numbers between 1 and 700 are completely divisible by 17?

- (a) 42 (b) 41
(c) 45 (d) 46

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (b) : Numbers between 1 and 700 which are exactly divisible by 17.

17, 34697.

$$l = a + (n-1) \times d$$

$$697 = 17 + (n-1) \times 17$$

$$680 = (n-1) \times 17$$

$$40 = n - 1$$

$$n = 41$$

Hence, required number (n) = 41

9. What is the total number of odd and even divisors of 120, respectively?

- (a) 12,4 (b) 16,0
(c) 4,12 (d) 8,8

RRB NTPC 01.02.2021 (Shift-II) Stage I

Ans. (c) : Divisors of 120–

1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24

30, 40, 60, 120

Number of even divisors – 12,

Number of odd divisors – 4

10. When 19^{300} is divided by 20, find the remainder.

- (a) 2 (b) 1 (c) 3 (d) 4

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (b) : From question,

$$\frac{19^{300}}{20} \Rightarrow \frac{(20-1)^{300}}{20} \Rightarrow 0 + (-1)^{300} = 1(\text{Remainder})$$

11. Which of the following is the greatest three digit number that is divisible by 13?

- (a) 990 (b) 575
(c) 988 (d) 908

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (c) : Greatest three digit number = 999

$$\text{On dividing by 13} = \frac{999}{13} = 76 \frac{11}{13}$$

\therefore 999 divided by 13 leaves remainder 11.

\therefore The greatest three digit number divisible by 13 = 999 – 11 = 988

12. The number 93248x6 is divisible by 11. Then digit x is equal to.

- (a) 5 (b) 2 (c) 8 (d) 7

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : Divisibility rule of 11–In a given number if the difference of sum of digits at even place and at odd place is zero or multiple of 11, then that number will also be divisible by 11.

$$(9+2+8+6) - (3+4+x)$$

$$25 - (7+x) = 11$$

$$18 - x = 11$$

$$x = 18 - 11$$

Hence, x = 7

13. $(41^{43} + 43^{43})$ is divisible by:

- (a) 86 (b) 74 (c) 12 (d) 84

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : $(x^n + a^n)$ is divisible by $(x + a)$, if the value of n is odd

\therefore 43 is a odd number, therefore $(41^{43} + 43^{43})$ will be divisible by 41 + 43 = 84

14. If pq is a two-digit number, then pq – qp will be completely divisible by:

- (a) 9 (b) 7
(c) 6 (d) 5

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (a) : Let the two digit number (pq) = 10x + y

$$\text{Then, qp} = 10y + x$$

According to the question,

$$pq - qp$$

$$= 10x + y - (10y + x)$$

$$= 10x + y - 10y - x$$

$$= 9x - 9y$$

$$= 9(x - y)$$

Hence pq – qp will be completely divisible by 9.

15. If n is a natural number then $n^3 - n$ is always divisible by.....

- (a) 8 (b) 6
(c) 5 (d) 4

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (b) : \therefore n is a natural number.

$$\therefore n^3 - n = n(n^2 - 1) = n(n+1)(n-1)$$

$n(n+1)(n-1)$ {Multiplication of three consecutive natural numbers}

On putting the value of n = 2

$$n^3 - n = n(n+1)(n-1) = 2 \times 3 \times 1 = 6$$

again put the value of n = 3

$$n^3 - n = 3 \times 4 \times 2 = 24$$

\therefore The product of any three consecutive number will always be divisible by both 2 and 3, which then means that, it will also always be divisible by 6.

Note- The multiplication of three consecutive natural numbers will be always divisible by 6.

16. If a positive number N, when divided by 5 leaves a remainder 3, then the unit's place digit of N is?

(a) 0 or 5 (b) 0 or 2
(c) 3 or 8 (d) 1 or 5

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : Required positive number

$$\begin{aligned} &= 5K+3 (\because K = 0,1,2,\dots) \\ &= 5 \times 0 + 3 = 3 \text{ (On putting } K = 0) \\ &= 5 \times 1 + 3 = 8 \text{ (On putting } K = 1) \\ &= 5 \times 60 + 3 = 303 \text{ (On putting } k = 60) \\ &= 5 \times 61 + 3 = 308 \text{ (On putting } k = 61) \end{aligned}$$

Hence, unit digit of N = 3 or 8

17. A number when divided by 7 leaves a remainder 4. What will be the remainder when the square of the same number is divided by 7?

(a) 2 (b) 4
(c) 1 (d) 3

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let, Quotient = n

Number = Divisor \times Quotient + Remainder

Number = $7 \times n + 4$ (Given, Remainder = 4)

On putting n = 1,

Number = $7 \times 1 + 4 = 11$

On dividing the number by 7,

Remainder = 4

Hence, on dividing the square of 11 by 7

$$\text{Remainder} = \frac{(11)^2}{7} = \frac{121}{7} = 2$$

18. The smallest positive number which must be added to the greatest number of 4 digits in order that the sum may be exactly divisible by 307 is:

(a) 307 (b) 132 (c) 306 (d) 176

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (b) : The greatest number of 4 digits = 9999

$$307 \overline{)9999} \begin{array}{r} 32 \\ -921 \\ \hline 789 \\ -614 \\ \hline 175 \end{array}$$

Hence, the smallest number to be added = $307 - 175 = 132$

19. How many numbers from 3 to 60 are odd numbers that are exactly divisible by 5?

(a) 7 (b) 5 (c) 8 (d) 6

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (d) : Odd numbers between 3 to 60 which are divisible by 5.

5, 15, 25, 35, 45, 55

So total number of odd numbers from 3 to 60 which are exactly divisible by 5 = 6.

20. How many numbers between 300 and 1000 are divisible by 7?

(a) 994 (b) 301 (c) 101 (d) 100

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question, Numbers between 300 and 1000 are divisible by 7

301, 308, 315,994

$$l = a + (n - 1)d$$

$$\Rightarrow 994 = 301 + (n - 1) \times 7$$

$$\Rightarrow \frac{994 - 301}{7} = (n - 1)$$

$$\Rightarrow n - 1 = 99$$

$$\Rightarrow n = 100$$

Hence required answer is 100.

21. Find the greatest number of five digits, which is exactly divisible by 468.

(a) 99684 (b) 99486
(c) 99864 (d) 99468

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (a) : The greatest number of five digits = 99999

$$468 \overline{)99999} \begin{array}{r} 213 \\ 936 \\ \hline 639 \\ 468 \\ \hline 1719 \\ 1404 \\ \hline \end{array}$$

Required number = $99999 - 315 = 99684$

22. In between 250 – 1000, how many numbers are completely divisible by 5, 6 & 7.

(a) 5 (b) 7 (c) 6 (d) 3

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : LCM of 5, 6, 7 –

$$\begin{array}{r|l} 2 & 5, 6, 7 \\ 3 & 5, 3, 7 \\ 5 & 5, 1, 7 \\ 7 & 1, 1, 7 \\ \hline & 1, 1, 1 \end{array}$$

$$2 \times 3 \times 5 \times 7 = 210$$

\therefore Numbers from 250 to 1000 which are divisible by 5, 6, 7 will be always divisible by 210 or in multiples of 210.

Therefore, the numbers are $210 \times 1, 210 \times 2, 210 \times 3, 210 \times 4, 210 \times 5$

210, 420, 630, 840,

Hence, the required numbers = 3

23. The largest four-digit number that is exactly divisible by 83 is:

(a) 9936 (b) 9954
(c) 9960 (d) 9966

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : The largest four-digit number = 9999

$$83 \overline{)9999} \begin{array}{r} 12 \\ 83 \\ \hline 169 \\ 166 \\ \hline 39 \end{array}$$

Therefore required number = $9999 - 39 = 9960$

Hence, 9960 is the largest four-digit number which is exactly divisible by 83.

24. $(47)^{25} - 1$ is exactly divisible by:

- (a) 21 (b) 24
(c) 23 (d) 19

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (c) : $(47)^{25} - 1$

$a^n - b^n$ is completely divisible by $(a - b)$

When $n =$ odd numbers,

As per the question

$n = 25$ (Odd number)

$a = 47, b = 1$

Then,

$a - b = 47 - 1 = 46 = 2 \times 23$

Hence, $47^{25} - 1$ is divisible by 23.

25. If 111 1 (n digits) is divisible by 9, then the least value of n is:

- (a) 18 (b) 12
(c) 3 (d) 9

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : When the sum of all the digits of a number is divisible by 9, then number will be divisible by 9.

Given number–

- 111.....1 (n digits)
- When $n = 1$, number is 1, which is not divisible by 9.
- When $n = 2$, number is 11, which is a prime number and thus not divisible by 9.
- When $n = 3$, number is 111 and $1+1+1=3$, which is not divisible by 9.

.....

- When $n = 9$, number is 111111111 and $1+1+1+1+1+1+1+1+1=9$, which is divisible by 9

Hence, the least possible value of n is 9.

26. A number when divided by 280 leaves 73 as the remainder. When the same number is divided by 35, the remainder will be:

- (a) 4 (b) 2
(c) 3 (d) 7

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let number = N

$N = 280K + 73$

$= (35 \times 8)K + 70 + 3$

$= 35(8K + 2) + 3$

$N = 35m + 3$(i) (where, $m = 8K + 2$)

or $N = 35q + r$(ii)

On comparing both equation,

$r = 3$

Hence, on dividing the same numbers by 35 the remainder will be 3.

27. The least number that is divisible by all the numbers from 2 to 10 is–

- (a) 2520 (b) 100
(c) 504 (d) 9

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (a) : Required number = LCM of 2, 3, 4, 5, 6, 7, 8, 9, 10

$= 2, 3, (2 \times 2), 5, (2 \times 3), 7, (2 \times 2 \times 2), (3 \times 3) \times (2 \times 5)$

$= 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 2520$

28. How many numbers greater than 2 and less than 30 are divisible by 1 and themselves

- (a) 9 (b) 29
(c) 27 (d) 11

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (a) : Prime number–The numbers which is only divisible by 1 and itself are known as prime number.

The prime numbers greater than 2 and less than 30 are–

$= 3, 5, 7, 11, 13, 17, 19, 23, 29 =$ Total 9 numbers

Hence, the required number = 9

29. $3^{71} + 3^{72} + 3^{73} + 3^{74} + 3^{75}$ is divisible by:

- (a) 8 (b) 5
(c) 11 (d) 7

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (c) : $3^{71} + 3^{72} + 3^{73} + 3^{74} + 3^{75}$

$= 3^{71}(3^0 + 3^1 + 3^2 + 3^3 + 3^4)$

$= 3^{71}(1 + 3 + 9 + 27 + 81)$

$= 3^{71} \times 121$

$= 3^{71} \times 11^2$

Hence, given series will be divisible by 11.

30. The smallest 5 digit number that leaves a remainder of 6 when divided by 7 is :

- (a) 10009 (b) 10002
(c) 10003 (d) 10007

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : Smallest number of 5 digits = 10000

10000

7 \downarrow Remainder=4

Required number = $10000 + (6 - 4) = 10002$

31. N is a whole number which when, divided by 6 leaves the remainder 4. Find the remainder when $2N$ is divided by 6.

- (a) 4 (b) 8
(c) 2 (d) Zero

RRB NTPC 28.04.2016 Shift : 1

Ans : (c) Let the quotient be “ a ” when N is divided by 6.

$\therefore N = 6a + 4$(i)

By equation (i) $\times 2$,

$2N = 2 \times 6a + 8$

$2N = 12a + 6 + 2$

$2N = 6(2a + 1) + 2$

Hence, the required remainder will be 2.

32. Find the least 6 digit number that is a multiple of 18.

- (a) 100000 (b) 999900
(c) 100008 (d) 100006

RRB NTPC 29.04.2016 Shift : 1

Ans : (c) The smallest 6 digit number = 100000

$$\begin{array}{r} 5555 \\ 18 \overline{)100000} \\ \underline{90} \\ 100 \\ \underline{90} \\ 100 \\ \underline{90} \\ 100 \\ \underline{90} \\ 10 \end{array}$$

The remainder is 10, hence $18 - 10 = 8$ is added to the number will make it completely divisible.

Hence, the required number = $100000 + 8 = 100008$

33. What number should be deducted from 1265 to make it divisible by 29 exactly?

(a) 15 (b) 16 (c) 18 (d) 17

RRB NTPC 05.04.2016 Shift : 3

Ans : (c) From question,

$$\begin{array}{r} 43 \\ 29 \overline{)1265} \\ \underline{116} \\ \times 105 \\ \underline{87} \\ 18 \end{array}$$

Hence, 18 should be subtracted from 1265 to make it completely divisible by 29.

34. Find the least number to be added to 1739 so that it is exactly divisible by 11.

(a) 11 (b) 2
(c) 1 (d) 10

RRB NTPC 30.03.2016 Shift : 1

Ans : (d) To get the required number divide 1739 by 11 then subtract the remainder from the divisor.

$$\begin{array}{r} 158 \\ 11 \overline{)1739} \\ \underline{11} \\ \times 63 \\ \underline{55} \\ \times 89 \\ \underline{88} \\ \times 1 \end{array}$$

Hence, the required number will be $11 - 1 = 10$.

35. Find the remainder, when 3^{10} is divided by 7.

(a) 4 (b) 3
(c) 5 (d) 6

RRB NTPC 18.04.2016 Shift : 3

Ans : (a) $3^{10} = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

$$= 59049$$

$$\therefore \begin{array}{r} 59049 \\ 7 \end{array}$$

= 4 remainder

Type-2

Problems Based on Specificity of Digits

36. In a five digit number, the digit in the hundred's place is 2 and the digit in the unit's place is twice the digit in the hundred's place. The digit at thousands place is zero. The digit in the ten thousand's place is the sum of the digit in the hundred's place and the digit in the unit's place. The digit in the ten's place is the digit in the ten thousand's place minus 1. The number is:

(a) 60234 (b) 60224
(c) 60254 (d) 60264

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let us assume the number be abcde

As per question,

$$\begin{aligned} c &= 2 \\ e &= 2 \times c \\ e &= 2 \times 2 \\ e &= 4 \\ b &= 0 \\ a &= 2 + 4 \\ a &= 6 \\ d &= 6 - 1 \\ d &= 5 \end{aligned}$$

Putting all values, then the required number = 60254

37. What is the smallest four digit number formed by using the digits 3, 5, 0, 6?

(a) 3056 (b) 0356
(c) 0536 (d) 3506

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : The smallest four-digit number formed by 3, 5, 0, 6 = 3056

38. What is the smallest five-digit number formed by using the digits 2, 3, 4, 0, 5?

(a) 23045 (b) 20435
(c) 02345 (d) 20345

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : The smallest five digit number that can be formed from the digits 2, 3, 4, 0, 5 is = 20345

39. Find sum of the smallest and the largest positive numbers of 6 digits which contains only digits 0, 4, 6 and each of these digits appears at least once.

(a) 666444 (b) 604604
(c) 666666 (d) 1066646

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question-

\therefore Smallest 6 digit no = 400006

Greatest 6 digit no = 666640

\therefore Required sum = $400006 + 666640 = 1066646$

40. How many times is digit 3 comes in counting from 301 to 399?

(a) 119 (b) 11
(c) 121 (d) 21

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

100's place - (301, 302, 303, 399) = 99 times

10's place - (30, 31, 32, 39) = 10 times

1's place - (03, 13, 23, 93) = 10 times

\therefore Required answer = $99 + 10 + 10 = 119$ times

41. Find the two-digit number such that the sum of its digits is 8 and the digits of the number get reversed when 36 is added to it.

(a) 71 (b) 35
(c) 62 (d) 26

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let number = $10x + y$

According to the question,

$$x + y = 8 \quad \dots (i)$$

$$(10x + y) + 36 = 10y + x$$

$$9y - 9x = 36$$

$$y - x = 4 \quad \dots (ii)$$

On solving equation (i) and equation (ii)

$$x = 2$$

$$y = 6$$

$$\text{Hence, required number} = 10x + y = 10 \times 2 + 6 = 26$$

42. If the number 2893#\$ is divisible by 8 and 5, then one possible choice of the digits that come in the place of # and \$ can be:

(a) 0, 2 (b) 2, 2
(c) 0, 0 (d) 2, 0

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (d) : Divisibility rule of '5' \Rightarrow If a number has '0' or '5' in its unit digit then it is completely divisible by 5. Divisibility rule of '8' \Rightarrow If the last three digits of a given number are divisible by '8' then number will be always divisible by 8.

from option 'd',

On putting the value of # = 2 and \$ = 0

$$\frac{289320}{5} \Rightarrow 57864$$

$$\frac{289320}{8} \Rightarrow 36165$$

Hence, option (d) will be correct.

43. If the largest 4-digit number is subtracted from the smallest 6-digit number, then the remainder will be:

(a) 90000 (b) 99991
(c) 80001 (d) 90001

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : The smallest number of 6 - digit = 100000

$$\text{The largest number of 4 - digit} = \underline{9999}$$

$$\text{Required number} = \underline{90001}$$

44. How many significant digits are there to the right of the decimal point in the product of 95.75 and 0.02554?

(a) 5 (b) 3
(c) 4 (d) 6

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

$$\text{Ans. (d) : } 95.75 \times 0.02554 \\ = 2.445455$$

So the number obtained as the product of 95.75 and 0.0254 will have 6 significant digits to the right of the decimal point.

45. What is the value of the digits A and B?

$$BA \times B3 = 57A$$

(a) A = 2, B = 4 (b) A = 3, B = 5
(c) A = 5, B = 2 (d) A = 5, B = 3

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (c) : From option (c) Putting the values of A and B in the equation.

$$A = 5, B = 2$$

$$BA \times B3 = 57A$$

$$25 \times 23 = 575$$

$$575 = 575$$

Hence, option (c) will be correct.

46. The difference between the greatest and the smallest six-digit numbers is:

(a) 988888 (b) 999999
(c) 888888 (d) 899999

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : The largest six digit number is 999999

The smallest six digit number is 100000

$$\therefore \text{Required difference} = 999999 - 100000 = 899999$$

47. The sum of the greatest and smallest numbers of six digits is:

(a) 100000 (b) 199999
(c) 999999 (d) 1099999

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : According to question,

$$\text{Greatest number of six-digit} = 999999$$

$$\text{Smallest number of six-digit} = 100000$$

$$\text{Hence required sum} = 999999 + 100000 \\ = 1099999$$

Hence, the required consecutive numbers will be 7 and 8.

Type-3 Problems Based on Composite and Prime Numbers

48. The greatest prime number less than 200 is:

(a) 199 (b) 193
(c) 197 (d) 191

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : The greatest prime number less than 200 is 199.

49. Which of the following numbers is prime?

(a) 323 (b) 571
(c) 513 (d) 715

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : According to option,

571 is a prime number. Whereas 323 is divisible by 17, 513 is divisible by 3 and 715 is divisible by 5.

50. Find the smallest three digit prime number?

(a) 107 (b) 109
(c) 103 (d) 101

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (d) : The smallest three-digit prime number = 101

51. Which of the following pairs of numbers are co-prime?

(a) 28, 81 (b) 12, 27
(c) 21, 56 (d) 36, 20

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (a) : Co-prime numbers are the numbers whose common factor is only 1.

Hence, in the given option (28, 81) are co-prime numbers.

52. One-third of the sum of all the prime numbers greater than 5 but less than 18 is the square of:

(a) 3 (b) 5
(c) 6 (d) 4

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (d) : Prime numbers greater than 5 but smaller than 18 = 7, 11, 13, 17

According to the question-

$$= \frac{7+11+13+17}{3}$$

$$= \frac{48}{3} = 16 = (4)^2$$

Hence, required number = 4

53. Which of the following is a prime number?

(a) 143 (b) 173
(c) 123 (d) 213

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (b) : Prime number are the numbers, which are only divisible by 1 and itself.

From the given options-

- (a) 143 is divisible by 11, so it is not a prime number.
(b) 173 is divisible by 1 and itself, so it is a prime number.
(c) 123 is divisible by 3, so it is not a prime number.
(d) 213 is divisible by 3, so it is not a prime number.

54. Find the sum of prime no. between 50 and 60.

(a) 118 (b) 114
(c) 110 (d) 112

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (d) : The prime number between 50 and 60- 53 and 59

Required Sum = 53 + 59 = 112

55. Find the number of all prime numbers less than 55.

(a) 18 (b) 17
(c) 16 (d) 15

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (c) : The number of all prime numbers less than 55 is 16

i.e. $\Rightarrow (2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53)$

56. The number of pairs of twin primes between 1 and 100 are:

(a) 7 (b) 8
(c) 10 (d) 9

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (b) : The number of pairs of twin primes between 1 and 100 are 8.

The numbers are -

$\{(3,5), (5,7), (11,13), (17,19), (29,31), (41,43), (59,61), (71,73)\}$

Note- Twins prime numbers are that numbers whose difference is 2.

57. The number that has factors other than 1 and itself is called a number.

(a) Prime Number (b) Composite Number
(c) Even Number (d) Odd Number

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (b) : Composite Number:- Numbers which have more than two factors.

Ex- 4, 6, 8 -----

Prime Number:- Numbers which have only two factor 1 and itself is called prime number.

58. Find the number of prime number less than 20.

(a) 9 (b) 7
(c) 10 (d) 8

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : Prime number less than 20.

2, 3, 5, 7, 11, 13, 17 and 19

Hence the number of prime number less than 20 = 8

59. Three prime number are arranged in descending order. If the product of the first two is 323 and that of the last two is 221, then what is the value of the biggest prime number?

(a) 17 (b) 19
(c) 13 (d) 23

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let the consecutive prime numbers are x, y and z in which x is biggest prime number.

According to the question,

$$x \times y = 323$$

Taking

$$x = 19$$

$$y = 17$$

$$19 \times 17 = 323$$

Taking y = 17 and z = 13

$$\text{And } 17 \times 13 = 221$$

So, the biggest prime number is = 19

60. How many of the integers between 109 and 121, both inclusive, are prime numbers?

(a) 1 (b) 0
(c) 2 (d) 3

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (c) : Two integers (109, 113) between 109 and 121 both inclusive are prime numbers.

61. The sum of which four odd prime numbers is 34?

(a) 1, 3, 5, 7 (b) 3, 5, 7, 9
(c) 3, 5, 11, 13 (d) 3, 7, 11, 13

RRB NTPC 04.04.2016 Shift : 2

Ans : (d) From option- (d)

$$3 + 7 + 11 + 13 = 34$$

62. In a prime number.....

(a) There are more than two divisors.
(b) The number divided by itself and 1.
(c) It has no divisor.
(d) Is not a positive integer.

RRB NTPC 30.03.2016 Shift : 2

Ans : (b)

A prime number is divided by only itself and 1.

63. Find out which of the following sets form co-prime numbers.

(a) (12, 7) (b) (21, 42)
(c) (3, 9) (d) (43, 129)

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) Co-prime numbers- The set of two such numbers whose HCF is 1, is called co-prime numbers.

\therefore In option (a), HCF of the numbers (12, 7) = 1

64. Which of the following is an odd composite number?

(a) 13 (b) 17 (c) 12 (d) 15

RRB NTPC 18.01.2017 Shift : 2

Ans : (d) In the given options odd composite number will be 15.

65. Find the sum of first 8 odd prime numbers.

(a) 77 (b) 98 (c) 75 (d) 100

RRB NTPC 19.04.2016 Shift : 2

Ans : (b) First 8 odd prime numbers = 3, 5, 7, 11, 13, 17, 19, 23

Sum of the numbers = $3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 = 98$

66. How many prime numbers are between positive integers 60 and 100?

(a) 9 (b) 6
(c) 7 (d) 8

RRB NTPC 06.04.2016 Shift : 1

Ans : (d) The prime numbers between 60 and 100 = 61, 67, 71, 73, 79, 83, 89, 97

Hence, Total 8 prime numbers will be between 60 and 100.

Type - 4 Problems Based on Basic Concept of Numbers

67. If each packet contains the same number of pencils and there are 96 pencils in all in 12 packets, how many packets will one have to purchase if one requires 304 pencils?

(a) 39 (b) 38 (c) 33 (d) 36

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (b) : ∵ Pencils present in 12 packets = 96

∵ Pencils present in 1 packet = $\frac{96}{12} = 8$ Pencils

Number of packets required for 304 pencils

$$= \frac{304}{8} = 38 \text{ Packets.}$$

68. From $\frac{3}{4}$ of a number P, Ramakrishna subtracts $\frac{2}{3}$ of another number Q and obtain $\frac{5}{8}$ as the difference. What is the answer Ramakrishna should obtain if he subtracts eight times of Q from nine times of P?

(a) $\frac{15}{2}$ (b) $\frac{25}{4}$ (c) $\frac{20}{3}$ (d) $\frac{25}{3}$

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (a) : According to the question,

$$P \times \frac{3}{4} - Q \times \frac{2}{3} = \frac{5}{8}$$

$$\Rightarrow \frac{3P}{4} - \frac{2Q}{3} = \frac{5}{8} \Rightarrow \frac{9P - 8Q}{12} = \frac{5}{8}$$

$$\Rightarrow 9P - 8Q = \left(\frac{5}{8}\right) \times 12 \Rightarrow 9P - 8Q = \frac{60}{8}$$

$$\therefore 9P - 8Q = \frac{15}{2}$$

69. In a class of 80 students $\frac{1}{10}$ of the class likes

chocolate D and $\frac{1}{20}$ of the class likes chocolate

E. What is the difference between the number of students who like chocolate D and the number of students who like chocolate E ?

(a) 2 (b) 9
(c) 5 (d) 4

RRB NTPC (Stage-2) 17/06/2022 (Shift-I)

$$\text{Ans. (d) : Students who likes chocolate D} = 80 \times \frac{1}{10} = 8$$

$$\text{Students who likes chocolate E} = 80 \times \frac{1}{20} = 4$$

Hence the required difference = $8 - 4 = 4$

70. Sunita won $\frac{3}{5}$ of the marbles that were there in the beginning of the game. Ravi won $\frac{2}{3}$ of the remaining marbles while Sunny won the remaining 60 marbles. How many marbles did Sunita Win?

(a) 255 (b) 240 (c) 285 (d) 270

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (d) : Let, number of marbles be x.

$$\text{Won by Sunita} = \frac{3x}{5}$$

$$\text{Number of remaining marbles} = x - \frac{3x}{5} = \frac{2x}{5}$$

$$\text{Won by Ravi} = \frac{2x}{5} \times \frac{2}{3} = \frac{4x}{15}$$

According to the question,

$$\frac{3x}{5} + \frac{4x}{15} + 60 = x$$

$$60 = x - \left(\frac{3x}{5} + \frac{4x}{15}\right)$$

$$60 = x - \frac{13x}{15}$$

$$\therefore \frac{2x}{15} = 60 \Rightarrow x = 450$$

$$\text{Number of marbles won by Sunita} = 450 \times \frac{3}{5} = 270$$

71. If the sum of five consecutive multiples of 2 is 660, then find the largest number.

(a) 162 (b) 130
(c) 125 (d) 136

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the five consecutive multiple of 2 – 2x, 2x+2, 2x+4, 2x+6, 2x+8

According to the question,

$$2x + 2x + 2 + 2x + 4 + 2x + 6 + 2x + 8 = 660$$

$$10x + 20 = 660$$

$$10x = 640$$

$$x = 64$$

$$\text{Hence, largest number} = 2x + 8 = 2 \times 64 + 8$$

$$= 128 + 8$$

$$= 136$$

72. In a farmer's house, there are chickens and goats. The total number of their heads is 42 and the total number of their legs is 138. Find the number of chickens.

(a) 15 (b) 18
(c) 20 (d) 22

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the number of chickens = x

Number of goats = y

According to the question,

$$x + y = 42 \text{ --- (i)}$$

$$2x + 4y = 138 \text{ --- (ii)}$$

On solving the equation (i) \times 4 and (ii)

$$4x + 4y = 168$$

$$\underline{2x + 4y = 138}$$

$$2x = 30$$

$$\boxed{x = 15}$$

Hence, the number of chickens = x = 15

73. In a class of 40 students, the number of girls is three fifth of the number of boys. Then find the number of boys in the class.

(a) 18 (b) 25
(c) 14 (d) 15

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number of boys be x.

Then the number of girls = $x \times \frac{3}{5}$

Total number of students in the class = $x + \frac{3}{5}x = 40$

$$\frac{8}{5}x = 40$$

$$x = 40 \times \frac{5}{8} = 25$$

Hence, the number of boys in the class x = 25.

74. A 1.5 kg cake is divided equally among 10 boys. How much cake will each boy get?

(a) 10 g (b) 1500 g
(c) 15 g (d) 150 g

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,

$$1.5 \text{ kg cake} = \frac{1.5}{10} \text{ kg} = \frac{15}{100} \text{ kg} = \frac{3}{20} \text{ kg}$$

$$\frac{3}{20} \times 1000 \Rightarrow 150 \text{ g}$$

75. A class has 48 students, on a specific day, only $\frac{3}{8}$ of the students were present; the number of absentees on the same day would be:

(a) 28 (b) 38
(c) 30 (d) 18

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (c) : Total number of students in the class = 48 ---- (Given)

Number of present students = $\frac{3}{8}$ of total students

Number of absent students = $1 - \frac{3}{8} = \frac{5}{8}$ of total students

$$\text{Total number of absent students} = 48 \times \frac{5}{8} = 30 \text{ students}$$

76. 1200 apples were distributed among a group of boys. Each boy got thrice time of the apples as the number of boys in that group. The number of boys in the group was.

(a) 15 (b) 20
(c) 25 (d) 40

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the no. of boys in group = x

No. of apple got by each boy = 3x

Total no. of apples = $x \times 3x = 1200$

$$3x^2 = 1200$$

$$x^2 = 400$$

$$x = 20$$

No. of boys (x) = 20

77. Sunila had $9\frac{1}{4}$ kg of flour to make bread with.

If the recipe says that she needs $1\frac{1}{8}$ kg to make one loaf of bread, how many loaf can she make? Estimate to the nearest whole number.

(a) 8 (b) 7
(c) 9 (d) 10

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (a) :

$$\begin{array}{r} 1 \quad 37 \\ 9 \overline{) \quad} \\ \underline{9 \quad} \quad \\ \text{Number of loaves} = \frac{4}{4} = 4 \end{array}$$

$$\frac{37 \times 8}{4 \times 9} = \frac{74}{9} = 8.22$$

Hence, number of loaves = 8

78. If Reeta types the numbers from 2 to 222, both inclusive, then how many times will she have to press the buttons on the number pad?

(a) 555 (b) 558
(c) 557 (d) 556

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

No. of buttons on the number pad pressed from 2 to 9 = 8

No. of buttons on number pad pressed from 10 to 99 = $90 \times 2 = 180$

Again, no. of buttons on number pad pressed from 100 to 222

$$= 123 \times 3 = 369$$

Hence, total no. of buttons pressed on the number pad = $8 + 180 + 369 = 557$

79. Of the residents of a housing society, $\frac{13}{18}$ own a cars and $\frac{48}{65}$ of the car owners have purchased covered parking space. If 136 of the residents parked the car in the open, how many residents were there in the society.
 (a) 900 (b) 720 (c) 630 (d) 650

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the total number of residents in the society = x

Number of people who have a car = $x \times \frac{13}{18}$

Number of people who purchased covered parking space = $\frac{13x}{18} \times \frac{48}{65} = \frac{8x}{15}$

According to the question,

$$\frac{13x}{18} - \frac{8x}{15} = 136$$

$$\frac{65x - 48x}{90} = 136$$

$$\frac{17x}{90} = 136$$

$$x = \frac{136 \times 90}{17} = \frac{12240}{17} = 720$$

80. Pragma invited male and females to her birthday party in the ratio of 7 : 6. If the number of males in the party were 56, then the total number of guests attending the party were?
 (a) 48 (b) 104 (c) 108 (d) 112

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let number of males = 7x

and, number of female = 6x

According to the question-

$$7x = 56$$

$$x = 8$$

$$\begin{aligned} \therefore \text{Total number of guests} &= 7x + 6x \\ &= 13x \\ &= 13 \times 8 \\ &= 104 \end{aligned}$$

81. What is the sum of the cube of the natural numbers from 1 to 10, both inclusive?
 (a) 3023 (b) 3025
 (c) 3024 (d) 3022

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (b) : The sum of the cube of the natural numbers from 1 to 10-

$$= 1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3 + 8^3 + 9^3 + 10^3$$

$$= \left(\frac{10 \times 11}{2} \right)^2 \quad \left\{ \because \sum n^3 = \left[\frac{n(n+1)}{2} \right]^2 \right\}$$

$$= \frac{100 \times 121}{4} = 3025$$

82. The sum of two numbers is 40 and their product is 60. The sum of their reciprocals is:
 (a) $\frac{3}{4}$ (b) $\frac{3}{2}$ (c) $\frac{2}{3}$ (d) $\frac{1}{2}$

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the two numbers are x and y

According to the question,

$$x + y = 40 \quad \dots\dots\dots(i)$$

and

$$x \times y = 60 \quad \dots\dots\dots(ii)$$

$$\text{Sum of reciprocal of numbers} = \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy}$$

From equation (i) and (ii)

$$= \frac{40}{60} \Rightarrow \frac{2}{3}$$

83. What is the sum of the cubes of the natural numbers from 5 to 14?

- (a) 10930 (b) 10925
 (c) 10935 (d) 10920

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (b): The sum of the cubes of natural number

$$= \left[\frac{n(n+1)}{2} \right]^2$$

Sum of cubes of all natural numbers from 5 to 14

$$= [\text{Sum of cubes of number 1 to 14}] - [\text{Sum of cubes of numbers 1 to 4}]$$

$$= \left[\frac{14(14+1)}{2} \right]^2 - \left[\frac{4(4+1)}{2} \right]^2$$

$$= (105)^2 - (10)^2$$

$$= 11025 - 100 = 10925$$

84. If the difference between squares of two consecutive positive odd integers is 56, then the two consecutive odd integers are.

- (a) 17,19 (b) 13,15
 (c) 11,13 (d) 15,17

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : Suppose first odd number = a

and, second consecutive odd number = a+2

According to the question,

$$(a+2)^2 - (a)^2 = 56$$

$$a^2 + 4 + 4a - a^2 = 56$$

$$a = \frac{52}{4} = 13$$

First Number (a) = 13

Second Number (a + 2) = 13+2 = 15

85. An orchard has 5776 trees and the arrangement of trees is such that there are as many rows as there are trees in a row. Then the number of rows is:

- (a) 48 (b) 76
 (c) 65 (d) 56

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let the number of trees be X and the number of rows also X.

According to the question,

$$X \times X = 5776$$

$$X^2 = 5776$$

$$X = 76$$

Hence, the number of rows (X) = 76

86. What is the sum of the squares of the numbers from 3 to 18?

- (a) 2103 (b) 2102 (c) 2101 (d) 2104

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (d)

Sum of squares of the first 'n' terms $= \frac{n(2n+1)(n+1)}{6}$

$$\begin{aligned} \text{Sum of squares of numbers from 3 to 18} &= (1^2 + 2^2 + 3^2 + 4^2 + \dots + 18^2) - (1^2 + 2^2) \\ &= \frac{18(18 \times 2 + 1)(18 + 1)}{6} - 5 \\ &= \frac{18 \times 37 \times 19}{6} - 5 \\ &= 2109 - 5 \\ &= 2104 \end{aligned}$$

87. The sum of two numbers is 20 and their product is 96. What is the difference between the two numbers?

- (a) 4 (b) 5
(c) 6 (d) 8

RRB NTPC 08.02.2021 (Shift-II) Stage I

Ans. (a) : Let the two numbers are x and y.

According to the question,

$$x + y = 20$$

$$xy = 96$$

From,

$$\begin{aligned} x - y &= \sqrt{(x + y)^2 - 4xy} \\ &= \sqrt{(20)^2 - 4 \times 96} \\ &= \sqrt{400 - 384} \\ &= \sqrt{16} \\ &= 4 \end{aligned}$$

88. If the sum of two numbers is 30 and the product is 50, then the sum of their reciprocals is:

- (a) $\frac{3}{5}$ (b) $\frac{5}{3}$
(c) $\frac{2}{5}$ (d) $\frac{5}{2}$

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (a) : Let the numbers be x and y –

Given,

$$x + y = 30 \dots\dots (i)$$

$$xy = 50 \dots\dots (ii)$$

The sum of reciprocals of numbers

$$= \frac{1}{x} + \frac{1}{y} = \frac{x + y}{xy}$$

$$= \frac{30}{50} = \frac{3}{5}$$

89. The sum of two numbers is 25 and their difference is 15. The ratio of the numbers is?

- (a) 3:2 (b) 5:3
(c) 4:1 (d) 2:3

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the numbers be a and b.

According to the question,

$$a + b = 25 \dots\dots (i)$$

$$a - b = 15 \dots\dots (ii)$$

By equation (i) and (ii)

$$\begin{aligned} \Rightarrow a &= \frac{25+15}{2} = 20 \\ b &= \frac{25-15}{2} = 5 \end{aligned}$$

Hence, the ratio of the numbers $a : b = 20 : 5 = 4 : 1$

90. The sum of two number is 16 and their product is 63. The sum of their reciprocal is equal to:

- (a) $\frac{16}{63}$ (b) $\frac{63}{16}$
(c) $\frac{8}{63}$ (d) $\frac{60}{63}$

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the numbers be x and y

According to the question,

$$x + y = 16 \dots\dots (i)$$

$$\text{and } x \times y = 63 \dots\dots (ii)$$

$$\text{then, } \frac{1}{x} + \frac{1}{y} = ?$$

$$\frac{x + y}{xy} = \frac{16}{63}$$

91. The difference between two numbers which are in the ratio 5 : 3 is 50. What is the product of the numbers?

- (a) 1035 (b) 9375
(c) 8575 (d) 9975

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (b) : Let the numbers are 5x and 3x

As per question,

$$5x - 3x = 50$$

$$2x = 50$$

$$x = 25$$

$$\begin{aligned} \text{Hence, the product of two numbers} &= 5x \times 3x = 15x^2 \\ &= 15 \times 25^2 = 9375 \end{aligned}$$

92. $\frac{3}{5}$ of a number is 10 more than half of the second number. If 8 is subtracted from $\frac{3}{7}$ of the first number, then it becomes 4 less than half of the second number. What is the sum of the two numbers?

- (a) 56 (b) 57
(c) 54 (d) 55

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (b) : Let the no. be x and y

According to the question,

$$\frac{3}{5}x - \frac{y}{2} = 10$$

$$6x - 5y = 100 \dots\dots (i)$$

$$\text{and } \frac{3}{7}x - 8 = \frac{y}{2} - 4$$

$$6x - 7y = 56 \dots\dots (ii)$$

On subtracting equation (ii) from equation (i)

$$2y = 44$$

$$y = 22$$

$$x = \frac{100 + 5 \times 22}{6} = 35 \quad \{\text{from equation (i)}\}$$

$$\text{Hence, sum of two numbers} = x + y = 35 + 22 = 57$$

93. There are 2401 students in a school. The PT teacher wants all of them to stand in rows and columns. Find the number of rows, if the number of rows is equal to the number of columns.

(a) 29 (b) 39 (c) 49 (d) 19

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let number of Rows = x
 then number of columns = x
 Number of students in school = 2401....(given)
 According to the question,
 \therefore Number of rows \times Number of columns = 2401
 $\therefore x \times x = 2401$
 $x^2 = 2401$
 $x = 49$

Hence, the number of rows (x) = 49

94. The sum of two numbers is 27 and the difference of their squares is 243. What is the difference between the numbers?

(a) 42 (b) 9 (c) 72 (d) 3

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let us the numbers be x and y respectively.
 Given,

$$x + y = 27 \text{ --- (i)}$$

$$x^2 - y^2 = 243$$

$$(x - y)(x + y) = 243 \text{ --- (ii)}$$

Putting value of $(x + y)$ from eqⁿ (i) in eq (ii),

$$(x - y) \times 27 = 243$$

$$(x - y) = \frac{243}{27} = 9$$

So, difference between the numbers = $x - y = 9$

95. What is the sum of the squares of the numbers from 1 to 12?

(a) 655 (b) 660
 (c) 650 (d) 665

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (c) : $1^2 + 2^2 + 3^2 + \dots + 12^2$
 From, Sum of the square of the first n natural numbers

$$= \frac{n(n+1)(2n+1)}{6}$$

$$= \frac{12 \times 13 \times 25}{6} = 650$$

96. Find the least number which must be added to the number 6412 to get a perfect square.

(a) 149 (b) 129
 (c) 181 (d) 150

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (a) : $(80)^2 = 6400$
 $(81)^2 = 6561$
 Hence on adding $6561 - 6412 = 149$, 6412 will be the perfect square.

97. Out of four consecutive numbers, the sum of the first two numbers is equal to the fourth number. What is half of the sum of the four numbers.

(a) 14 (b) 7
 (c) 9 (d) 2

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let four consecutive numbers be x , $(x + 1)$, $(x + 2)$ and $(x + 3)$

According to question,

$$x + (x + 1) = x + 3$$

$$x = 2$$

$$\begin{aligned} \text{Half of the sum of four number} &= \frac{4x + 6}{2} = 2x + 3 \\ &= 2 \times 2 + 3 \\ &= 7 \end{aligned}$$

98. 24 mango trees, 56 apple trees and 72 orange trees have to be planted in rows such that each row contains the same number of trees of one variety only. Find the minimum number of rows in which the above mentioned trees may be planted.

(a) 15 (b) 18
 (c) 17 (d) 19

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (d) :
 (Number of total columns \times Number of total rows)

$$24 = 8 \times 3$$

$$56 = 8 \times 7$$

$$72 = 8 \times 9$$

Total number of trees = $8(3 + 7 + 9)$

Total number of rows = $3 + 7 + 9 = 19$

99. What is the sum of the cubes of the first four natural numbers?

(a) 96 (b) 84
 (c) 100 (d) 1000

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (c) :

$$\text{Sum of cube of } n \text{ natural numbers} = \left[\frac{n(n+1)}{2} \right]^2$$

\therefore Sum of the cubes of the first four natural numbers

$$\begin{aligned} &= \left[\frac{4(4+1)}{2} \right]^2 \\ &= 100 \end{aligned}$$

100. $\frac{6}{11}$ of the people present in a hall are sitting in $\frac{9}{14}$ of the chairs available, and the rest are standing. If there are 30 empty chairs, how many people in the hall are standing?

(a) 40 (b) 35
 (c) 30 (d) 45

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (d) : Let the number of total chairs = x

$$\text{Then empty chairs} = x - \frac{9x}{14} = \frac{5x}{14}$$

$$\text{According to the question, } \frac{x \times 5}{14} = 30$$

$$x = 84 \text{ (Number of total chairs)}$$

Hence, number of people sitting on the chairs.

$$\Rightarrow 84 - 30 = 54$$

Let the total number of people be y then,

$$\frac{y \times 6}{11} = 54$$

or $y = 99$ people
 \therefore Number of people standing in the hall =
 $y \left(1 - \frac{6}{11}\right) = y \times \frac{5}{11}$
Hence, Number of people standing in the hall = $\frac{99 \times 5}{11}$
 $= 45$ people

- 101. One-fourth of one-eighth of a number is 300. What is one fifth of the same number?**
(a) 1900 (b) 1910
(c) 1920 (d) 1890

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let the required number = x
According to the question,

$$\left(x \times \frac{1}{8}\right) \times \frac{1}{4} = 300$$

$$x = 300 \times 32 \Rightarrow x = 9600$$

$$\therefore \text{Required answer} = 9600 \times \frac{1}{5} = 1920$$

- 102. Two-fifth of one-fourth of three-seventh of a number is 15. What is the half of that number?**
(a) 375 (b) 175
(c) 300 (d) 170

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number is x
According to the question,

$$x \times \frac{3}{7} \times \frac{1}{4} \times \frac{2}{5} = 15$$

$$x = 350$$

$$\text{then, half of that number} = \frac{350}{2}$$

$$= 175$$

- 103. Instead of multiplying a number by 2, Rahul divided it by 2 and got the answer as 2. What should be the actual answer?**
(a) 4 (b) 8
(c) 6 (d) 2

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number be = x
On dividing x by 2,

$$\frac{x}{2} = 2$$

$$x = 4$$

\therefore Actual answer = $2x$

$$= 2 \times 4 = 8$$

- 104. In a reunion of class XII, out of 45 students, 30 students participated in the function. If all present in the function shake hands with one other, find the total number of handshakes.**
(a) 870 (b) 435
(c) 841 (d) 900

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (b) : Total number of handshakes

$$= \frac{n(n-1)}{2}$$

$$= \frac{30(30-1)}{2}$$

$$= 15 \times 29$$

$$= 435$$

- 105. If the sum of two numbers is 26 and their difference is 12. Find the difference of their squares.**

$$(a) \ 296$$

$$(b) \ 312$$

$$(c) \ 324$$

$$(d) \ 336$$

RRB NTPC 05.04.2016 Shift : 2

Ans : (b) Let the numbers be x and y .

$$x + y = 26$$

$$x - y = 12$$

\therefore The difference of the squares,

$$= x^2 - y^2$$

$$= (x + y)(x - y)$$

$$= 26 \times 12 = 312$$

- 106. If the product of two numbers is thrice of their sum, if 1st number is 12 find the 2nd number.**

$$(a) \ 2$$

$$(b) \ 3$$

$$(c) \ 4$$

$$(d) \ 5$$

RRB NTPC 04.04.2016 Shift : 1

Ans : (c) Let the 2nd number be x .

$$x \times 12 = (x + 12) \times 3$$

$$12x = 3x + 36$$

$$9x = 36$$

$$\text{Hence, } x = 4$$

- 107. Find the smallest four digit number which is a perfect square.**

$$(a) \ 1000$$

$$(b) \ 1024$$

$$(c) \ 1081$$

$$(d) \ 1064$$

RRB NTPC 04.04.2016 Shift : 1

Ans : (b) The smallest 4 digit number = 1000

32	1000
3	9
+3	100
62	124
2	-24

Hence, the smallest 4 digit perfect square number
 $= 1000 + 24$
 $= 1024$

- 108. A number when multiplied by $\frac{6}{5}$ gives $\frac{108}{125}$.**

The number is :

$$(a) \ \frac{625}{648}$$

$$(b) \ \frac{648}{625}$$

$$(c) \ \frac{18}{25}$$

$$(d) \ \frac{25}{18}$$

RRB NTPC 15.03.2021 (Shift-II) Stage I

Ans. (c) : Let the number = x

As per question

$$x \times \frac{6}{5} = \frac{108}{125} \text{ or } x = \frac{108 \times 5}{6 \times 125}$$

$$\Rightarrow x = \frac{18}{25}$$

109. Four fifths of a number is 12 more than three fourths of the number. Find the number.

- (a) 120 (b) 160
(c) 200 (d) 240

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (d) : Let the number = x

According to the question,

$$\frac{4}{5}x - \frac{3}{4}x = 12$$

$$\frac{16x - 15x}{20} = 12$$

$$x = 240$$

Hence the number is 240.

110. If $\frac{1}{5}$ of a number multiplied by $\frac{2}{3}$ of the same number gives 480, then the number is?

- (a) 60 (b) 70
(c) 80 (d) 100

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the number be x

According to the question-

$$x \times \frac{1}{5} \times x \times \frac{2}{3} = 480$$

$$\frac{2x^2}{15} = 480$$

$$x^2 = 240 \times 15$$

$$x^2 = 3600$$

$$x = 60$$

111. One-fourth of a number is equal to three-eighth of another number. If 30 is added to the first number, then it becomes six times that of the second number. The first number is:

- (a) 12 (b) 20
(c) 10 (d) 15

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the first number is x and the second number is y then,

According to the question,

$$\frac{x}{4} = \frac{3}{8}y$$

$$x = \frac{3}{2}y \quad \dots (i)$$

$$\text{And } x + 30 = 6y \quad \dots (ii)$$

Substituting the value of x from equation (i) in equation (ii)-

$$\frac{3}{2}y + 30 = 6y$$

$$\frac{3}{2}y - 6y = -30$$

$$\frac{-9y}{2} = -30$$

$$y = \frac{20}{3}$$

From equation (i)-

$$x = \frac{3}{2} \times \frac{20}{3}$$

$$x = 10$$

112. Calculate the positive number which when added by 15 is equal to 100 times the reciprocal of the number.

- (a) 10 (b) 20
(c) 5 (d) 15

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let the positive number is x

According to the question,

$$x + 15 = \frac{1}{x} \times 100$$

$$x^2 + 15x = 100$$

$$x^2 + 15x - 100 = 0$$

$$x^2 + 20x - 5x - 100 = 0$$

$$x(x + 20) - 5(x + 20) = 0$$

$$(x + 20)(x - 5) = 0$$

$$x = 5$$

Hence the number is 5.

113. A number consists of 3 digits whose sum is 18 and the middle digit is equal to the sum of other two. If the number increased by 297 when its digits are reversed, then what is the number?

- (a) 585 (b) 495
(c) 396 (d) 486

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the digits of number are x, y and z respectively.

Given,

$$x + y + z = 18 \quad (i)$$

$$\text{And, } y = x + z$$

On putting the value of y in equation (i),

$$x + x + z + z = 18$$

$$2x + 2z = 18$$

$$x + z = 9 \quad (ii)$$

According to the question,

$$100x + 10y + z + 297 = 100z + 10y + x$$

$$99x + 297 = 99z$$

$$x + 3 = z \quad (iii)$$

On putting the value of z in equation (ii),

$$x + x + 3 = 9$$

$$2x = 6$$

$$x = 3$$

On putting the value of x in equation (ii),

$$x + z = 9$$

$$3 + z = 9$$

$$z = 6$$

From equation (i),

$$y = x + z$$

$$y = 3 + 6$$

$$y = 9$$

Hence, the number will be 396.

114. If a positive number is subtracted from its square, we get 812. Find the number.

- (a) 25 (b) 23
(c) 27 (d) 29

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the number be x
and square of number $= x^2$

According to the question,

$$x^2 - x = 812$$

$$x^2 - x - 812 = 0$$

$$x^2 - 29x + 28x - 812 = 0$$

$$x(x - 29) + 28(x - 29) = 0$$

$$(x - 29)(x + 28) = 0$$

$$x - 29 = 0$$

$$x = 29$$

115. The sum of 4 consecutive odd numbers is 160. Find the smallest number.

- (a) 27 (b) 37
(c) 35 (d) 25

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the 4 consecutive odd numbers is

$$x, x + 2, x + 4, x + 6$$

According to the question,

$$(x) + (x + 2) + (x + 4) + (x + 6) = 160$$

$$4x + 12 = 160$$

$$4x = 148$$

$$x = \frac{148}{4}$$

$$x = 37$$

Hence, the smallest number $(x) = 37$

116. There are two numbers with the difference of 14 between them and the difference of their squares is 56. What are those numbers?

- (a) 9, -5 (b) 2, 16
(c) 3, 17 (d) 23, -9

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the two numbers be x and y respectively.

According to the question,

$$x - y = 14 \dots\dots\dots(i)$$

$$\text{And } x^2 - y^2 = 56 \dots\dots\dots(ii)$$

$$(x + y)(x - y) = 56 \dots\dots[\text{From, } x^2 - y^2 = (x + y)(x - y)]$$

$$x + y = 4 \dots\dots\dots(iii)$$

From equation (i) and equation (iii),

$$x = 9, y = -5$$

117. The sum of half, one-third and one-fifth of a number exceeds the number by 12. What is the number?

- (a) 144 (b) 360
(c) 444 (d) 122

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let the number $= x$

According to the question,

$$x \left(\frac{1}{2} + \frac{1}{3} + \frac{1}{5} \right) - x = 12$$

$$\frac{31x}{30} - x = 12$$

$$\frac{x}{30} = 12$$

$$x = 360$$

118. A number when reduced by $22\frac{1}{2}\%$ becomes 217, find the number.

- (a) 315 (b) 212
(c) 280 (d) 420

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (c) : Let the number is x

According to the question,

$$x \left(100\% - 22\frac{1}{2}\% \right) = 217$$

$$x \times 77\frac{1}{2}\% = 217$$

$$x = \frac{217 \times 100 \times 2}{155}$$

$$\therefore x = 280$$

119. When 38 is added to 30% of a number. The result is 50. What is the number?

- (a) 20 (b) 80
(c) 60 (d) 40

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the number $= x$

According to the question,

$$x \times \frac{30}{100} + 38 = 50$$

$$x \times \frac{30}{100} = 50 - 38 = 12$$

$$x \times 30 = 100 \times 12$$

$$x = \frac{1200}{30} = 40$$

Hence, number $(x) = 40$

120. The sum of two numbers is 20 and the difference of their squares is 80. Select both the numbers from the given alternatives.

- (a) 15, 5 (b) 13, 7
(c) 11, 9 (d) 12, 8

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the numbers are x and y

According to the question,

$$x + y = 20 \dots\dots (i)$$

$$x^2 - y^2 = 80$$

$$(x - y)(x + y) = 80$$

From equation (i),

$$x - y = 4 \dots\dots (ii)$$

From equation (i) and (ii),

$$\therefore x = 12, y = 8$$

121. When 40 is subtracted from a number, it reduces to its 60%. What is the number?
 (a) 130 (b) 160
 (c) 200 (d) 100

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the number be x
 According to the question,

$$x - 40 = x \times \frac{60}{100}$$

$$x - \frac{60x}{100} = 40$$

$$\frac{40x}{100} = 40$$

$$x = 100$$

122. The 5th part of a number when divided by 3 yields three times half of tenth part of half of 80. What is the number?
 (a) 60 (b) 90
 (c) 45 (d) 44

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number is x
 According to the question,

$$\frac{x \times \frac{1}{5}}{3} = \left[\frac{80 \times \frac{1}{2} \times \frac{1}{10}}{2} \right] \times 3$$

$$\frac{x}{15} = 40 \times \frac{1}{10} \times \frac{1}{2} \times 3$$

$$x = 90$$

123. If three-fourth of a number is 50 more than its one-third, then find the number.
 (a) 140 (b) 130
 (c) 120 (d) 100

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the number is x
 According to the question,

$$\frac{3}{4}x = \frac{1}{3}x + 50$$

$$\frac{3}{4}x - \frac{1}{3}x = 50$$

$$\frac{9x - 4x}{12} = 50$$

$$5x = 600$$

$$x = 120$$

124. The sum of the digits of a two digit number is 11. If the digits are interchanged, the number decreases to 63. Find the number.
 (a) 83 (b) 92
 (c) 29 (d) 38

RRB NTPC 04.04.2016 Shift : 3

Ans : (b) Let the tens digit be x and the unit digit be y of the number.

∴ The number = $10x + y$
 According to the question-
 $x + y = 11$ (i)
 And $10y + x = 10x + y - 63$

$$9x - 9y = 63$$

$$x - y = 7 \quad \text{..... (ii)}$$

By adding equation (i) and (ii)

$$2x = 18 \Rightarrow x = 9, y = 2$$

Hence, the number = $10x + y = 10 \times 9 + 2 = 92$

125. The sum of the digits of a two digit number is 9. When 27 is added to the number, the place of the digits are interchanged. Find the number.

- (a) 45 (b) 36
 (c) 18 (d) 27

RRB NTPC 03.04.2016 Shift : 1

Ans : (b) Let the unit digit be x in the two digit number.
 According to the question,

The tens digit = $9 - x$ And the number = $10(9 - x) + x$

$$10(9 - x) + x + 27 = 10x + 9 - x$$

$$\Rightarrow 90 - 10x + x + 27 = 9x + 9$$

$$\Rightarrow 90 + 27 - 9 = 18x$$

$$\Rightarrow 18x = 108$$

$$x = 6$$

$$\text{Then, the number} = 10(9 - x) + x$$

$$= 10(9 - 6) + 6 = 36$$

126. The sum of the digits of a two digit number is 13. If those digits are interchanged, the number gets decreased by 27. Find the changed number.

- (a) 85 (b) 76
 (c) 67 (d) 58

RRB NTPC 02.04.2016 Shift : 1

Ans : (d) Let the tens digit is x,

The unit digit = $13 - x$

$$\therefore \text{The number} = 10 \times x + (13 - x)$$

According to the question,

$$10 \times (13 - x) + x = 10 \times x + (13 - x) - 27$$

$$130 - 10x + x = 10x + 13 - x - 27$$

$$18x = 144$$

$$x = 8$$

$$\therefore \text{The changed number,}$$

$$= 10 \times (13 - x) + x$$

$$= 10 \times (13 - 8) + 8$$

$$= 10 \times 5 + 8 = 58$$

127. The sum of a two digit number is 9. The number is reduces from 45, when the digits are interchanged, find the changed number.

- (a) 45 (b) 72
 (c) 63 (d) 27

RRB NTPC 02.04.2016 Shift : 2

Ans : (d) Let the tens digit be = x

And the unit digit be = y

$$\text{Number} = 10x + y$$

$$\text{Given, } x + y = 9 \quad \text{..... (1)}$$

According to the question,

$$(10x + y) - (10y + x) = 45$$

$$9x - 9y = 45$$

$$x - y = 5 \quad \text{..... (2)}$$

$$\text{Equation (1) + (2)}$$

$$2x = 14 \Rightarrow x = 7$$

From, equation (1),

$$y = 9 - 7 = 2$$

$$\text{Hence, The required number} = 10y + x = 10 \times 2 + 7 = 27$$

128. The sum of digits of a two-digit number is 10. When the digits are reversed, the number decreases by 54. Find the new number.

(a) 73 (b) 28 (c) 82 (d) 37

RRB NTPC 02.04.2016 Shift : 3

Ans : (b) Let the tens digit of the number is x and the unit digit is y .

$$\therefore \text{The number} = 10x + y$$

According to the question,

$$x + y = 10 \text{ -----(i)}$$

$$\text{And } 10x + y = 10y + x + 54$$

$$\Rightarrow 9x - 9y = 54 \Rightarrow x - y = 6 \text{ -----(ii)}$$

By adding equation (i) and (ii),

$$2x = 16 \Rightarrow x = 8, y = 2$$

Hence, the new number

$$= 10y + x = 10 \times 2 + 8 = 28$$

129. The sum of digits of a two-digit number is 10. When the digits are interchanged, the number increases by 18. Find the number.

(a) 46 (b) 64
(c) 19 (d) 28

RRB NTPC 29.03.2016 Shift : 1

Ans : (a) Let the tens digit of the number is x and the unit digit is y .

$$\therefore \text{The number} = 10x + y$$

According to the question-

$$x + y = 10 \text{ -----(i)}$$

$$\text{And } 10x + y = 10y + x - 18$$

$$9x - 9y = -18$$

$$x - y = -2 \text{ -----(ii)}$$

By adding equation (i) and (ii) -

$$2x = 8 \Rightarrow x = 4, y = 6$$

$$\text{Hence, The required number} = 10 \times 4 + 6 = 46$$

130. Calculate the sum of squares of numbers from 1 to 9.

(a) 284 (b) 285
(c) 385 (d) 380

RRB NTPC 27.04.2016 Shift : 1

Ans : (b) The sum of squares of first n numbers

$$= \frac{n(n+1)(2n+1)}{6}$$

\therefore The sum of squares from 1 to 9 will be-

$$= \frac{9(9+1)(18+1)}{6} = \frac{9 \times 10 \times 19}{6} = 285$$

131. Calculate the sum of squares of number from 1 to 10.

(a) 384 (b) 285
(c) 385 (d) 380

RRB NTPC 30.04.2016 Shift : 2

Ans : (c) The sum of squares of first n numbers

$$= \frac{n(n+1)(2n+1)}{6}$$

The sum of squares of the numbers from 1 to 10 will be-

$$= \frac{10(10+1)(20+1)}{6} = \frac{10 \times 11 \times 21}{6} = 385$$

132. Find two consecutive numbers where thrice the first number is more than twice the second number by 5.

(a) 5 and 6 (b) 6 and 7
(c) 7 and 8 (d) 9 and 10

RRB NTPC 28.03.2016 Shift : 1

Ans : (c) Let the two consecutive numbers be x and $x+1$.

According to the question-

$$3x = 2(x+1) + 5$$

$$\Rightarrow 3x = 2x + 7$$

$$\Rightarrow x = 7$$

133. Which of the following numbers is a perfect square?

(a) 0.09 (b) 8.1
(c) 0.025 (d) All

RRB NTPC 29.03.2016 Shift : 2

Ans : (a) $0.09 = (0.3)^2$

Hence, only 0.09 is a perfect square number.

Type - 5 Problems Based on Rational and Irrational Numbers

134. 0.23 is

(a) An irrational number
(b) A rational number
(c) A prime number
(d) A composite number

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let us assume

$$y = 0.23 \text{(i)}$$

Multiplying by 100 in equation (i)-

$$100y = 23.23 \text{ (ii)}$$

Subtracting eqⁿ (i) from eqⁿ (ii)

$$99y = 23$$

$$y = \frac{23}{99} \text{ (Rational number)}$$

135. $(\sqrt{3} + \sqrt{11})^2$ is a/an

(a) Natural number (b) Whole number
(c) Irrational number (d) Rational number

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : From question,

$$(\sqrt{3} + \sqrt{11})^2 = 3 + 11 + 2 \times \sqrt{3} \times \sqrt{11}$$

$$(\sqrt{3} + \sqrt{11})^2 = 14 + 2\sqrt{33}$$

Therefore $(\sqrt{3} + \sqrt{11})^2$ is an irrational number

136. The product of $\sqrt{2}$ and $\sqrt{3}$ is:

(a) Sometimes a rational number and sometimes an irrational number
(b) Equal to 4
(c) A rational number
(d) An irrational number

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (d) : From above question,

$$\sqrt{2} \times \sqrt{3} = \sqrt{6} \text{ (irrational number)}$$

An irrational number is a real number that can't be expressed in the form p/q , $q \neq 0$

for example - $\sqrt{2}, \sqrt{5}, \sqrt{7}$, etc.

137. The number of rational number between 5 and 7 is:

- (a) 2 (b) 0
(c) Infinite (d) 1

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (c) : Note:- The number of rational numbers between any two integers is infinite. Hence, the number of rational numbers between 5 and 7 will be infinite.

138. $3 + 2\sqrt{5}$ is :

- (a) Rational number (b) Irrational number
(c) Composite number (d) Natural number

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (b) : Irrational number: The set of real numbers that cannot be represented in form of p/q is called irrational number.

Example- $\sqrt{2}$, $\sqrt{3}$

$\therefore 3 + 2\sqrt{5}$ is an irrational number.

139. The number 1.112123123412345..... is a/an:

- (a) Integer (b) Natural number
(c) National number (d) Irrational number

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) : The number 1.112123123412345 is an irrational number.

140. Which of the following rational number lies

between $\frac{1}{4}$ and $\frac{1}{2}$.

- (a) $\frac{1}{6}$ (b) $\frac{1}{8}$
(c) $\frac{3}{5}$ (d) $\frac{3}{8}$

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (d) :

$$= \frac{\frac{1}{4} + \frac{1}{2}}{2} = \frac{\frac{1+2}{4}}{2} = \frac{3}{8}$$

Therefore, rational number $\frac{3}{8}$ will lie between $\frac{1}{4}$ and $\frac{1}{2}$.

141. Express $-\frac{40}{56}$ as a rational number whose numerator is -5.

- (a) $-\frac{5}{6}$ (b) $-\frac{5}{8}$
(c) $-\frac{5}{7}$ (d) $-\frac{5}{18}$

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (c) : From question,

$$-\frac{40}{56} = -\frac{8 \times 5}{8 \times 7} = -\frac{5}{7}$$

It is clear that option (c) is the required rational number.

142. $\frac{(3\sqrt{5} + \sqrt{125})}{(\sqrt{80} + 6\sqrt{5})}$ is -

- (a) A rational number (b) A natural number
(c) An integer (d) An irrational number

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

$$\frac{3\sqrt{5} + \sqrt{125}}{\sqrt{80} + 6\sqrt{5}}$$

$$= \frac{3\sqrt{5} + 5\sqrt{5}}{4\sqrt{5} + 6\sqrt{5}}$$

$$= \frac{8\sqrt{5}}{10\sqrt{5}} = \frac{8}{10} = \frac{4}{5} \text{ (rational number)}$$

Therefore $\frac{3\sqrt{5} + \sqrt{125}}{\sqrt{80} + 6\sqrt{5}}$ is a rational number

143. Number 0.232323 can be written in rational form as:

- (a) $\frac{23}{999}$ (b) $\frac{23}{99}$ (c) $\frac{23}{9}$ (d) $\frac{23}{990}$

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (b) : 0.232323.....

$$= 0.\overline{23}$$

$$= \frac{23}{99}$$

144. Which of the following rational number lies between 9.2 and 10.5?

- (a) 9.15 (b) 9.55
(c) 10.67 (d) 9.08

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (b) \because 9.55 is the rational number lies between 9.2 and 10.5.

145. Which of the following is a rational number between $\sqrt{5}$ and $\sqrt{7}$?

- (a) $4\frac{1}{5}$ (b) $1\frac{1}{5}$
(c) $2\frac{2}{5}$ (d) $3\frac{1}{5}$

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : $\sqrt{5} = 2.23$ and $\sqrt{7} = 2.64$

From the given options,

$$(a) 4\frac{1}{5} = \frac{21}{5} = 4.2 \quad (b) 1\frac{1}{5} = \frac{6}{5} = 1.2$$

$$(c) 2\frac{2}{5} = \frac{12}{5} = 2.4 \quad (d) 3\frac{1}{5} = \frac{16}{5} = 3.2$$

Hence $2\frac{2}{5}$ is a rational number between $\sqrt{5}$ and $\sqrt{7}$.

146. Which of the following is not a rational number?

$$\sqrt{3^2 + 4^2}, \sqrt{12.96}, \sqrt{125} \text{ and } \sqrt{900}$$

- (a) $\sqrt{12.96}$ (b) $\sqrt{900}$
(c) $\sqrt{125}$ (d) $\sqrt{3^2 + 4^2}$

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (c) : $\sqrt{3^2 + 4^2} = \sqrt{9+16} = \sqrt{25} = 5 \rightarrow$ Rational number

$$\sqrt{12.96} = \sqrt{1296 \times 10^{-2}} = \frac{36}{10} = \frac{18}{5} \rightarrow \text{Rational number}$$

$$\sqrt{125} = \sqrt{5 \times 5 \times 5} = 5\sqrt{5} \rightarrow \text{Irrational Number}$$

$$\sqrt{900} = \sqrt{30 \times 30} = 30 \rightarrow \text{Rational Number}$$

Hence, $\sqrt{125}$ is not a rational number.

147. From the given options, find the rational number between the range $\frac{2}{4}$ and 0.6.

- (a) $\frac{11}{25}$ (b) $\frac{21}{40}$
(c) $\frac{3}{4}$ (d) $\frac{11}{4}$

RRB NTPC 19.01.2017 Shift : 2

Ans : (b) From option (b),

The rational number between $\frac{2}{4} = 0.5$ and 0.6

$$= \frac{21}{40} = 0.525$$

Hence, $0.5 < 0.525 < 0.6$

148. All irrational numbers are-----numbers.

- (a) Integers (b) Imaginary
(c) Whole (d) Real

RRB NTPC 19.01.2017 Shift : 3

Ans : (d) All irrational numbers are real numbers.

Example- $\sqrt{2}$

Type-6 Problems Based on Unit Digit and Factorization of Numbers

149. For any natural number n, $6^n - 5^n$ always ends with ;

- (a) 7 (b) 1
(c) 5 (d) 3

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) : The unit value of $6^n - 5^n$ for any natural number 'n' will always be 1 because any natural number in the power of 6 has its unit digit as 6. Similarly, any natural number in the power of 5 has its unit digit as 5.

$$\text{Ex - } 6^2 - 5^2 = 36 - 25 = 11$$

150. How many factors of $2^7 \times 3^4 \times 5^3 \times 7$ are even ?

- (a) 40 (b) 280
(c) 320 (d) 84

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (b) : Number of factors of $2^7 \times 3^4 \times 5^3 \times 7$

$$= (7+1)(4+1)(3+1)(1+1)$$

$$= 8 \times 5 \times 4 \times 2$$

$$= 320$$

\therefore Number of even factors = 320 – total number of odd factors.

$$= 320 - \{(4+1)(3+1)(1+1)\}$$

$$= 320 - \{5 \times 4 \times 2\}$$

$$= 320 - 40$$

$$= 280$$

151. Find the digit in the unit's place of $124^n + 124^{(n+1)}$, where n is any whole number.

- (a) 4 (b) 8
(c) 2 (d) 0

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : $124^n + 124^{(n+1)}$

On putting n = 1

$$= 124 + (124)^2$$

For unit digit $4 + 6 = 10$

Hence, It is clear that the digit come in the unit place will be '0'.

152. What is the unit digit in the following product?

$$91 \times 92 \times 93 \times \dots \times 99$$

- (a) 2 (b) 1 (c) 4 (d) 0

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (d) : $\because 91 \times 92 \times 93 \times 94 \times 95 \times 96 \times 97 \times 98 \times 99$

On multiplying all these numbers by taking their unit digits, you can see $5 \times 2 = 10$, $4 \times 5 = 20$ etc.

Hence the unit digit of number coming from the multiplication of all the number will be 0.

153. Find the number of factors of 4200.

- (a) 48 (b) 56 (c) 64 (d) 46

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (a) : $4200 = 2 \times 2 \times 2 \times 5 \times 5 \times 3 \times 7$

$$= 2^3 \times 5^2 \times 3^1 \times 7^1$$

The number of factors = $(3+1) \times (2+1) \times (1+1) \times (1+1)$

$$= 4 \times 3 \times 2 \times 2$$

$$= 48$$

154. How many factors does the number 12288 have?

- (a) 24 (b) 26
(c) 28 (d) 22

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (b) : $12288 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^{12} \times 3^1$

Hence numbers of factors = $(12+1) \times (1+1)$

$$= 13 \times 2$$

$$= 26$$

155. The unit digit in $4 \times 38 \times 764 \times 1256$ is :

- (a) 6 (b) 8
(c) 4 (d) 5

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) :

$$4 \times 38 \times 764 \times 1256$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$4 \times 8 \times 4 \times 6$$

$$= 32 \times 24$$

$$\downarrow \quad \downarrow$$

$$= 2 \times 4$$

Hence unit digit = 8

156. What is the unit digit of $[4523^{1632} \times 2224^{1632} \times 3225^{1632}]$

- (a) 1 (b) 0
(c) 4 (d) 5

RRB NTPC 18.01.2017 Shift : 3

Ans : (b) $\left[(4523)^{1632} \times (2224)^{1632} \times (3225)^{1632} \right]$

$$\Rightarrow (3)^4 \times (4)^4 \times (5)^4$$

$$81 \times 256 \times 625$$

$$1 \times 6 \times 5$$

$$30 \Rightarrow \boxed{0}$$

157. Calculate the total prime factors in the product of $\{(8)^{10} \times (9)^7 \times 7^8\}$

- (a) 45 (b) 54
(c) 52 (d) 65

RRB NTPC 18.04.2016 Shift : 2

Ans : (c) $(8)^{10} \times (9)^7 \times 7^8$

$$= (2^3)^{10} \times (3^2)^7 \times (7)^8$$

$$= 2^{30} \times 3^{14} \times 7^8$$

Hence, the total prime factors = $30 + 14 + 8 = 52$

158. Calculate the total prime factors in the product of $\{(16)^7 \times (27)^6 \times 5^9\}$

- (a) 28 (b) 43
(c) 55 (d) 56

RRB NTPC 16.04.2016 Shift : 2

Ans : (c) Total prime factors $\{(16)^7 \times (27)^6 \times 5^9\}$

$$= (2^4)^7 \times (3^3)^6 \times 5^9$$

$$= 2^{28} \times 3^{18} \times 5^9$$

$$= 28 + 18 + 9 = 55$$

159. Find the unit digit in the product of $(4211)^{102} \times (361)^{52}$

- (a) 3 (b) 1
(c) 4 (d) 7

RRB NTPC 16.04.2016 Shift : 3

Ans : (b)

The required unit digit in $(4211)^{102} \times (361)^{52}$
 $\Rightarrow (1)^{102} \times (1)^{52} = 1 \times 1 = 1$

160. Find the unit digit in the following $(1234)^{102} + (1234)^{103}$

- (a) 2 (b) 4
(c) 0 (d) 1

RRB NTPC 28.04.2016 Shift : 2

Ans : (c) Given expression: $(1234)^{102} + (1234)^{103}$

The unit digit,

$$= (4)^{102} + (4)^{103}$$

$$= (4^2)^{51} + (4^2)^{51} \times 4^1$$

$$= (16)^{51} + (16)^{51} \times 4^1$$

$$= 6 + 6 \times 4$$

$$= 6 + 24 = 30$$

Hence, the unit digit will be 0.

Type - 7 Problems Based on Place Value and Numerical Value

161. What is the place value of 5 in the number 56789214?

- (a) 5×10^6 (b) 5×10^4
(c) 5×10^7 (d) 5×10^5

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (c) : The place value of 5 in 56789214 –

56789214

$\rightarrow 5 \times 10^7$

162. Find the sum of the place value and the face value of 7 in the number 53736.

- (a) 77 (b) 707
(c) 770 (d) 777

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (b) : The place value and the face value of 7 in the number 53736.

Place value of 7 = 700

Face value of 7 = 7

Required sum = $700 + 7$

$$= 707$$

163. In the number 76897, what is the place value of 8?

- (a) 8 (b) 8000
(c) 800 (d) 80

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (c) : From question,

7 6 8 9 7
 Place value 7
 $\rightarrow 90$
 $\rightarrow 800$
 $\rightarrow 6000$
 $\rightarrow 70000$

Hence, place value of 8 in 76897 will be 800.

164. The face value of 8 in 758639 is :

- (a) 8000 (b) 80
(c) 800 (d) 8

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : In the given number = 758639

The face value of 8 = 8

165. Find the difference of the place and face values of 6 in 516372

- (a) 5998 (b) 6698
(c) 5394 (d) 5994

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : The place values of 6 in 516372 –

5 1 6 3 7 2

$\rightarrow 6 \times 1000 = 6000$

the face values of 6 = 6

Required difference = $6000 - 6$

$$= 5994$$

166. The sum of the place values of 3 in 3636 is:

- (a) 330 (b) 3030
(c) 3 (d) 3003

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (b) : The place value of 3 in 3636.

3 6 3 6

$$\rightarrow 3 \times 10 = 30$$

$$\rightarrow 3 \times 1000 = 3000$$

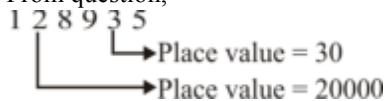
Sum of place values of 3 = $3000 + 30$
 $= 3030$

167. The difference between the place values of 2 and 3 in the number 128935 is:

- (a) 300 (b) 19970
(c) 20000 (d) 30

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (b) : From question,



Required difference = 20000 - 30 = 19970

168. The sum of the place values of 9 in 96961 is:

- (a) 9000 (b) 18
(c) 9090 (d) 90900

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (d) : Sum of the place value of 9 in number 96961
= 90000 + 900
= 90900

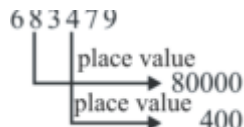
Hence, option (d) is correct.

169. Find the difference between the place values of 8 and 4 in the number 683479.

- (a) 7 (b) 80000
(c) 79600 (d) 76600

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (c) :



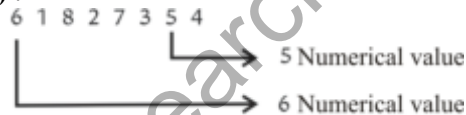
Hence, required difference = 80000 - 400 = 79600

170. Find the sum of the face values of 6 and 5 in 61827354

- (a) 60000300 (b) 30
(c) 40 (d) 11

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (d) :



Required sum = 6 + 5 = 11

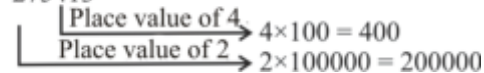
171. The difference between the place values of 2 and 4 in the number 275413 is

- (a) 196600 (b) 2
(c) 199600 (d) -2

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (c) :

Number 275413



∴ Difference between the place value of 2 and 4
= 200000 - 400 = 199600

172. The digit of hundred's place value of 19! is:

- (a) 0 (b) 9
(c) 4 (d) 1

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (a) : $19! = 19 \times 18 \times 17 \times 16 \times \dots \times 1$

Number of 5 in $19! = 3$

So number of zeros = 3

$19! = \dots\dots\dots 000$

Hence the digit of hundred's place value of $19!$ is 0.

Type - 8 Miscellaneous

173. In a group of students, the number of girls is three-fourth of the number of boys. If two-third of the number of girls and one-half of the number of boys like mango juice, then what fraction of the total number of girls and boys like mango juice?

- (a) $\frac{1}{7}$ (b) $\frac{4}{7}$
(c) $\frac{2}{7}$ (d) $\frac{3}{7}$

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) : Let the number of boys = 8

the number of girls = $8 \times \frac{3}{4} = 6$

According to the question,

Number of girls like mango juice = $6 \times \frac{2}{3} = 4$

Number of boys like mango juice = $8 \times \frac{1}{2} = 4$

Required fraction = $\frac{4+4}{8+6} = \frac{8}{14} = \frac{4}{7}$

174. A train started with 450 passengers. At the first stop, $\frac{1}{9}$ of them got down and 20 new passengers got in. At the second stop, $\frac{1}{6}$ of the passengers then existing got down and 19 new passengers boarded. With how many passengers did the train arrive at the third stop?

- (a) 420 (b) 369
(c) 400 (d) 394

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (b) : Number of passengers after first stop

$$= 450 - \left[450 \times \frac{1}{9} \right] + 20$$

$$= 450 - [50] + 20$$

$$= 400 + 20$$

$$= 420$$

Number of passengers after second stop

$$= 420 - \left[420 \times \frac{1}{6} \right] + 19$$

$$= 420 - 70 + 19$$

$$= 350 + 19 = 369$$

175. There is a carpet of length $20\frac{5}{2}$ m. How many small pieces of carpet, each of length $4\frac{1}{2}$ m, can be cut out of it?

- (a) 8 (b) 7
(c) 9 (d) 5

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (d) : Total length of carpet = $20\frac{5}{2} = \frac{45}{2}$ meters
 Length of small pieces of carpet = $\frac{9}{2}$ meters
 Required pieces = $\frac{\frac{45}{2}}{\frac{9}{2}} = 5$ pieces.

176. Rakesh donates blood twice in 3 years each time 330ml. How many litres of blood will he donate in 6 years.

- (a) 1.36 L (b) 1.30 L
 (c) 1.32 L (d) 1.34 L

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

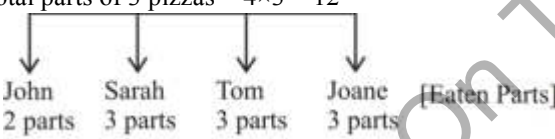
Ans. (c) : Blood donates twice in 3 years.
 Then the blood donates in 6 years $(2 \times 2) = 4$ times.
 Total blood donates in 6 years = $4 \times 330 = 1320$ ml
 $= \frac{1320}{1000}$ L = 1.32 L

177. John, Sarah, Tom and Joane bought 3 pizzas of the same size in all. John eat $\frac{2}{4}$ of a pizza. Sarah, Tom and Joane eat $\frac{3}{4}$ of a pizza each. How much pizza was left?

- (a) $\frac{1}{4}$ of a pizza (b) $\frac{1}{2}$ of a pizza
 (c) 1 pizza (d) $\frac{3}{4}$ of a pizza

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (a) : Suppose a pizza has 4 parts.
 Total parts of 3 pizzas = $4 \times 3 = 12$



John 2 parts Sarah 3 parts Tom 3 parts Joane 3 parts [Eaten Parts]

Remaining parts = $12 - (2 + 3 + 3 + 3) = 1$
 Remaining parts of 3 pizzas = $\frac{1}{12} \times 3 = \frac{1}{4}$ of a pizza

178. If $\frac{2}{5}$ of the number of girl students attending a school function is equal to $\frac{3}{5}$ of the number of boys attending the function. What fraction of the total students attending the function will be $\frac{2}{5}$ of the number of girl students attending the function?

- (a) $\frac{5}{6}$ (b) $\frac{2}{3}$
 (c) $\frac{1}{5}$ (d) $\frac{6}{25}$

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let, number of boys in function = x
 And number of girls in function = y
 According to the question,
 $y \times \frac{2}{5} = x \times \frac{3}{5} \Rightarrow x : y = 2 : 3$
 Required fraction = $\frac{y \times 2/5}{(x + y)} = \frac{3 \times 2/5}{5} = \frac{6}{25}$

179. Karuna reads $\frac{1}{4}$ th of a book in one hour. What fraction of the book will she be able to read in 2h 15 min?

- (a) $\frac{1}{9}$ (b) $\frac{1}{8}$
 (c) $\frac{9}{16}$ (d) 9

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (c) : Read parts in 1 hours = $\frac{1}{4}$
 $\therefore 2$ hours 15 minutes = $2\text{h} + \frac{15}{60}$ hours
 $= \left(2 + \frac{1}{4}\right)$ hours
 $= \frac{9}{4}$ hours
 \therefore Read parts in $\frac{9}{4}$ hours = $\frac{1}{4} \times \frac{9}{4}$
 $= \frac{9}{16}$

180. Jane won the lottery and get $\frac{1}{3}$ of the prize money she makes a donation of Rs. 6000 which is $\frac{1}{6}$ th part. The total amount of lottery is:

- (a) 36000 (b) 18000
 (c) 54000 (d) 108000

RRB NTPC 03.04.2016 Shift : 2

Ans : (d) Let the price of the lottery = Rs. x
 From the question-

$$\left(\frac{x}{3}\right) \times \frac{1}{6} = 6000$$

$$\frac{x}{18} = 6000$$

$$x = \text{Rs. } 108000$$

181. How many millimeters in 10 km?

- (a) 10^{10} (b) 10^9
 (c) 10^8 (d) 10^7

RRB NTPC 31.03.2016 Shift : 2

Ans : (d) 1 km = 1000 m
 $= 1000 \times 1000$ mm (1 m = 1000 mm)
 $= 10^6$ mm
 $\therefore 10$ km = $10 \times 10^6 = 10^7$ mm

182. What will be the next set of numbers in given series.

- (2, 3), (3, 5), (5, 7), (7, 11), (11, 13), _____
 (a) (13, 15) (b) (15, 17)
 (c) (13, 17) (d) (13, 19)

RRB NTPC 17.01.2017 Shift-1

Ans : (c) The above series is a set of prime numbers
 (2,3), (3,5), (5,7), (7,11), (11,13), (13,17)
 Therefore, the next set of the series is (13, 17)

183. By how much is $\frac{1}{6}$ th of 432 smaller than $\frac{3}{4}$ th of 216?

- (a) -90 (b) 72
 (c) 90 (d) 162

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question-

$$\frac{1}{6} \text{ part of } 432 = 432 \times \frac{1}{6} = 72$$

$$\text{and } \frac{3}{4} \text{ part of } 216 = 216 \times \frac{3}{4} = 162$$

$$\text{Required difference} = 162 - 72 = 90$$

184. Terry consumes 1700 mL of milk every day. How many litres of milk will she consume in 5 weeks?

- (a) 59 L (b) 60 L
(c) 58.5 L (d) 59.5 L

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (d) :

$$\therefore \text{ Terry consumes in 1 day} = 1700 \text{ mL}$$

$$\begin{aligned} \therefore \text{ In 5 weeks} &= 35 \text{ days} = \frac{1700 \times 35}{1000} \\ &= \frac{59500}{1000} \text{ L} \\ &= 59.5 \text{ L} \end{aligned}$$

185. Mohan earns ₹60 on first day and spends ₹50 on the second day. He again earns ₹60 on the third day and spends ₹50 on the fourth day and so on. On which day will he have ₹200 with him before spending?

- (a) 10th (b) 14th
(c) 28th (d) 29th

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (d) : Mohan earns on the first day = ₹60 and spends on the second day = ₹50

$$\text{Thus, in 2 days Mohan saves} = ₹10$$

Hence, Mohan saves in 28 days = ₹140

$$\text{Mohan will earn on 29th day} = ₹60$$

$$\text{So, On the 29th day Mohan has} = 140 + 60 = ₹200$$

186. Two bus tickets from city P to Q and three tickets from city P to R cost ₹99, but three tickets from city P to Q and two tickets from city P to R cost ₹91. What are the respective fares from city P to Q and from city P to R.

- (a) ₹23, ₹15 (b) ₹51, ₹32
(c) ₹15, ₹23 (d) ₹32, ₹51

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the fares from city P to Q = ₹x and the fares from city P to R = ₹y

According to the question,

$$2x + 3y = 99 \quad \dots(i)$$

$$3x + 2y = 91 \quad \dots(ii)$$

On multiplying by 3 in equation (i) and 2 in equation (ii)

$$6x + 9y = 297 \quad \dots(iii)$$

$$6x + 4y = 182 \quad \dots(iv)$$

From equation (iii) & (iv) we have –

$$5y = 115$$

$$y = ₹23$$

On putting the value of y in equation (i),

$$2x + 3 \times 23 = 99$$

$$2x + 69 = 99$$

$$2x = 99 - 69$$

$$x = \frac{30}{2}$$

$$x = ₹15$$

Hence the fares from city P to Q and the fares from city P to R are ₹15, ₹23 respectively.

187. There are 40 persons in a palace. If every person shakes hands with every other person, what will be the total number of handshakes?

- (a) 750 (b) 780
(c) 800 (d) 790

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) : Total number of handshakes = $\frac{n(n-1)}{2}$

$$\begin{aligned} &= \frac{40(40-1)}{2} \\ &= \frac{40 \times 39}{2} \\ &= 20 \times 39 \\ &= 780 \end{aligned}$$

188. In a group of 35 persons, 20 are young and 18 are girls. How many young girls are there in the group ?

- (a) 1 (b) 3
(c) 18 (d) 2

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

Girls 15 3 17 Young

It is clear from above venn diagram that number of young girls in the group = 3

189. X, Y and Z together earn ₹ 2,400/- in 15 days, X and Y together earn ₹ 1,840/- in 16 days. Y and Z together earn ₹ 1,530/- in 18 days. What is the daily earning (in ₹) of Y?

- (a) ₹50 (b) ₹40
(c) ₹60 (d) ₹30

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\text{Amount earned by X, Y and Z in 1 day} = \frac{2400}{15} = 160$$

$$\text{Amount earned by X, Y in 1 day} = \frac{1840}{16} = 115$$

$$\text{Amount earned by Y and Z in 1 day} = \frac{1530}{18} = 85$$

$$\begin{aligned} \therefore \text{ Daily earning of Y} &= (\text{Daily earning of X and Y together}) + (\text{Daily earning of Y and Z together}) - (\text{Daily earning by X, Y and Z together}) \\ &= 115 + 85 - 160 \\ &= 40 \end{aligned}$$

190. The remainder in the expression $27\frac{3}{4}$ is:

- (a) 6 (b) 4
(c) 3 (d) 8

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (c) : In the given expression,
 Dividend = quotient \times divisor + remainder
 $= 27 \times 4 + 3$
 \therefore Remainder = 3

191. A maximum of how many pieces of exact 17 cm length can be cut from a 960 cm long rod?

- (a) 60 (b) 58
 (c) 54 (d) 56

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : According to question

$$\text{Number of pieces} = \frac{960}{17} = 56 + \frac{8}{17}$$

Hence, number of pieces of exact 17 cm length will be 56.

192. Find the value of $\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots + \frac{1}{47.50}$

- (a) $\frac{49}{50}$ (b) $\frac{47}{150}$
 (c) $\frac{47}{50}$ (d) $\frac{49}{150}$

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (d) :

$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots + \frac{1}{47.50}$$

Given expression 1, 4, 7, ..., 47, and 4, 7, 10, ..., 50 are in arithmetic series whose difference is 3. In this case sum of given term—

$$\begin{aligned} & \frac{1}{\text{Difference}} \left(\frac{1}{\text{First term}} - \frac{1}{\text{Last term}} \right) \\ &= \frac{1}{3} \left(\frac{1}{1} - \frac{1}{50} \right) \\ &= \frac{1}{3} \times \frac{49}{50} \\ &= \frac{49}{150} \end{aligned}$$

193. How will you write 2.84 hours in hours, minutes and seconds?

- (a) 2 hours 8 minutes 4 seconds
 (b) 3 hours 24 minutes
 (c) 2 hours 50 minutes 24 seconds
 (d) 2 hours 50 minutes 4 seconds

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (c) :

$$\begin{aligned} 2.84 \text{ hours} &= 2 \text{ hours} + .84 \times 60 \text{ minutes} \\ &= 2 \text{ hours} + 50.4 \text{ minutes} \\ &= 2 \text{ hours} + 50 \text{ minutes} + 0.4 \times 60 \text{ seconds} \\ &= 2 \text{ hours} + 50 \text{ minutes} + 24 \text{ seconds} \end{aligned}$$

194. How will you write 8.17 hours in hours, minutes and seconds?

- (a) 8 hours, 17 minutes
 (b) 8 hours, 10 minutes, 12 seconds
 (c) 8 hours, 10 minutes, 7 seconds
 (d) 8 hours, 12 minutes

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (b) : 8.17 hours

$$\begin{aligned} &= 8 \text{ hours} + \frac{17}{100} \times 60 \text{ minutes} \\ &= 8 \text{ hours} + 10.2 \text{ minutes} \\ &= 8 \text{ hours} + 10 \text{ minutes} + \frac{2}{10} \times 60 \text{ seconds} \\ &= 8 \text{ hours, 10 minutes, 12 seconds} \end{aligned}$$

195. N has p more amount than K. Total amount of N and K together is ₹q. How much amount does K have?

- (a) $\frac{q}{2} + p$ (b) $2(p + q)$
 (c) $\frac{(p + q)}{2}$ (d) $\frac{(q - p)}{2}$

RRB NTPC 17.01.2017 Shift-2

Ans. (d) $N = K + p$ (i)

$$N + K = q$$

Putting the value of N from the equation (i)

$$K + p + K = q$$

$$2K = q - p,$$

$$\text{So, } K = \frac{q - p}{2}$$

196. Two-fifth of Narendra's salary is equal to Amit's salary and seven-ninth of Amit's salary is equal to Arun's salary. If the sum of the salaries is ₹770, what are the respective salaries of Narendra, Amit and Arun (in ₹)?

- (a) 450, 140, 180 (b) 450, 180, 140
 (c) 180, 450, 140 (d) 180, 140, 450

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

$$\text{Narendra's salary} \times \frac{2}{5} = \text{Amit's salary}$$

$$\frac{\text{Narendra's salary}}{\text{Amit's salary}} = \frac{5}{2}$$

$$\text{And Amit's salary} \times \frac{7}{9} = \text{Arun's salary}$$

$$\frac{\text{Amit's salary}}{\text{Arun's salary}} = \frac{9}{7}$$

$$\text{Narendra : Amit : Arun}$$

$$\begin{array}{ccc} 5 & : & 2 \\ 9 & : & 7 \end{array}$$

$$45 : 18 : 14$$

$$\text{The sum of their salaries} = ₹ 770$$

$$(45 + 18 + 14) \text{ units} \longrightarrow ₹ 770$$

$$77 \text{ units} \longrightarrow ₹ 770$$

$$1 \text{ unit} \longrightarrow ₹ 10$$

$$\text{Narendra's salary} = 45 \times 10 = ₹ 450$$

$$\text{Amit's salary} = 18 \times 10 = ₹ 180$$

$$\text{Arun's salary} = 14 \times 10 = ₹ 140$$

Hence, the salaries of Narendra, Amit and Arun are 450, 180 and 140 respectively.

Decimal Fractions

Type - 1 Problems Based on Finding The Smallest and Largest Fractions

1. Which of the following fractions is the largest?

$$\frac{7}{9}, \frac{6}{7}, \frac{22}{25} \text{ and } \frac{11}{13}$$

- (a) $\frac{11}{13}$ (b) $\frac{22}{25}$ (c) $\frac{7}{9}$ (d) $\frac{6}{7}$

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (b) : From equation,

$$\frac{7}{9} = 0.777$$

$$\frac{6}{7} = 0.857$$

$$\frac{22}{25} = 0.88$$

$$\frac{11}{13} = 0.846$$

Hence, fraction $\frac{22}{25}$ is the largest.

2. Which of the following fractions is the smallest?

- (a) $\frac{9}{11}$ (b) $\frac{11}{12}$ (c) $\frac{8}{13}$ (d) $\frac{10}{14}$

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (c) : From option,

$$\frac{9}{11} = 0.8181$$

$$\frac{11}{12} = 0.916$$

$$\frac{8}{13} = 0.615$$

$$\frac{10}{14} = 0.714$$

Hence, it is clear that smallest fraction is $\frac{8}{13}$.

3. Find the greatest fraction out of $-\frac{3}{2}, \frac{3}{2}, \frac{11}{4}, \frac{5}{2}$:

- (a) $\frac{3}{2}$ (b) $\frac{11}{4}$ (c) $\frac{5}{2}$ (d) $-\frac{3}{2}$

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (b) : From equation,

$$-\frac{3}{2} = -1.5$$

$$\frac{3}{2} = 1.5$$

$$\frac{11}{4} = 2.75$$

$$\frac{5}{2} = 2.5$$

It is clear that greatest fraction is $\frac{11}{4}$

4. Which of the following fractions is the smallest?

- (a) $\frac{7}{8}$ (b) $\frac{7}{10}$ (c) $\frac{3}{4}$ (d) $\frac{5}{7}$

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (b) : On writing given fraction in descending order,

$$\frac{7}{8} > \frac{3}{4} > \frac{5}{7} > \frac{7}{10}$$

$$0.87 > 0.75 > 0.71 > 0.70$$

Hence, $\frac{7}{10}$ will be the smallest fraction.

5. Which of the following fractions is the least of all?

- (a) $\frac{6}{5}$ (b) $\frac{4}{3}$ (c) $\frac{3}{2}$ (d) $\frac{5}{4}$

RRB NTPC 29.03.2016 Shift : 3

Ans : (a) From option,

$$\frac{6}{5} = 1.2, \quad \frac{4}{3} = 1.33$$

$$\frac{3}{2} = 1.5, \quad \frac{5}{4} = 1.25$$

Hence, it is clear that $\frac{6}{5}$ is the required least fraction of all.

6. The smallest of the fractions among $\frac{5}{8}, \frac{3}{4}, \frac{13}{16}, \frac{7}{12}$ is _____.

- (a) $\frac{5}{8}$ (b) $\frac{3}{4}$
(c) $\frac{13}{16}$ (d) $\frac{7}{12}$

RRB NTPC 27.04.2016 Shift : 2

Ans : (d) From question,

$$\frac{5}{8} = 0.62, \quad \frac{3}{4} = 0.75, \quad \frac{13}{16} = 0.81$$

$$\frac{7}{12} = 0.58$$

Hence, the smallest fraction is $\frac{7}{12}$.

7. Find the smallest of the following decimals.

- (a) $0.1 \times 0.1 \times 0.1$ (b) $0.03 / 3$
(c) $0.01 / 2$ (d) $0.1 \times 0.02 \times 0.2$

RRB NTPC 05.04.2016 Shift-1

Ans : (d) From options—
 (a) $0.1 \times 0.1 \times 0.1 = 0.001$
 (b) $0.03 / 3 = 0.01$
 (c) $0.01 / 2 = 0.005$
 (d) $0.1 \times 0.02 \times 0.2 = 0.0004$
 Hence option (d) is the smallest.

8. Find the smallest of the following decimals.

- (a) $0.2 \times 0.2 \times 0.2$ (b) $0.02 / 3$
 (c) $0.01 / 2$ (d) $0.1 \times 0.02 \times 2$

RRB NTPC 31.03.2016 Shift : 2

Ans : (d) From options—
 (a) $0.2 \times 0.2 \times 0.2 = 0.008$
 (b) $\frac{0.02}{3} = 0.0067$
 (c) $\frac{0.01}{2} = 0.005$
 (d) $0.1 \times 0.02 \times 2 = 0.004$
 Hence, it is clear that option (d) is the smallest.

Type - 2

Problems Based on Ascending and Descending Order of Fractions

9. The descending order of the fractions $\frac{2}{3}, \frac{1}{6}, \frac{1}{5}, \frac{3}{7}$ is:

- (a) $\frac{3}{7}, \frac{2}{3}, \frac{1}{5}, \frac{1}{6}$ (b) $\frac{2}{3}, \frac{3}{7}, \frac{1}{5}, \frac{1}{6}$
 (c) $\frac{3}{7}, \frac{1}{6}, \frac{1}{5}, \frac{2}{3}$ (d) $\frac{1}{6}, \frac{1}{5}, \frac{3}{7}, \frac{2}{3}$

RRB NTPC 15.03.2021 (Shift-II) Stage I

Ans. (b) : From question,

$$\frac{2}{3} = 0.666$$

$$\frac{1}{6} = 0.166$$

$$\frac{1}{5} = 0.200 \Rightarrow \frac{3}{7} = 0.428$$

Descending order = $0.666 > 0.428 > 0.200 > 0.166$

$$\frac{2}{3} > \frac{3}{7} > \frac{1}{5} > \frac{1}{6}$$

$$\Rightarrow \frac{2}{3}, \frac{3}{7}, \frac{1}{5}, \frac{1}{6}$$

10. The fractions $\frac{1}{3}, \frac{4}{7}, \frac{2}{5}$ written in ascending order are:

- (a) $\frac{1}{3}, \frac{4}{7}, \frac{2}{5}$ (b) All fractions are equal
 (c) $\frac{1}{3}, \frac{2}{5}, \frac{4}{7}$ (d) $\frac{4}{7}, \frac{1}{3}, \frac{2}{5}$

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : $\frac{1}{3} = 0.33$

$$\frac{4}{7} = 0.57$$

$$\frac{2}{5} = 0.4$$

Hence ascending order = $\frac{1}{3}, \frac{2}{5}, \frac{4}{7}$

11. Select the option that given decimal numbers 0.25, 1.24, 0.0882 and 2.67 are arranged in ascending order.

- (a) 2.67, 1.24, 0.25, 0.0882
 (b) 0.25, 1.24, 0.0882, 2.67
 (c) 1.24, 0.25, 2.67, 0.0882
 (d) 0.0882, 0.25, 1.24, 2.67

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (d) : On arranging the given decimal numbers in ascending order—

$0.0882 \rightarrow 0.25 \rightarrow 1.24 \rightarrow 2.67$

Hence, option (d) is correct.

12. Which of the following fractions are in ascending order?

- (a) $\frac{12}{18}, \frac{14}{17}, \frac{16}{19}$ (b) $\frac{14}{17}, \frac{12}{18}, \frac{16}{19}$
 (c) $\frac{16}{19}, \frac{14}{17}, \frac{12}{18}$ (d) $\frac{12}{18}, \frac{16}{19}, \frac{14}{17}$

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (a) : From options,

$$\frac{12}{18} = 0.66, \frac{14}{17} = 0.82, \frac{16}{19} = 0.84$$

Required ascending order = $\frac{12}{18}, \frac{14}{17}, \frac{16}{19}$

13. In which of the following options are the fractions arranged in ascending order?

- (a) $\frac{9}{11}, \frac{6}{7}, \frac{5}{6}, \frac{2}{5}, \frac{3}{8}$ (b) $\frac{6}{7}, \frac{5}{6}, \frac{9}{11}, \frac{2}{5}, \frac{3}{8}$
 (c) $\frac{2}{5}, \frac{6}{7}, \frac{9}{11}, \frac{3}{8}, \frac{5}{6}$ (d) $\frac{3}{8}, \frac{2}{5}, \frac{9}{11}, \frac{5}{6}, \frac{6}{7}$

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (d) : From option (d),

$$\frac{3}{8} = 0.375, \frac{2}{5} = 0.40$$

$$\frac{9}{11} = 0.8181, \frac{5}{6} = 0.8333$$

$$\frac{6}{7} = 0.857$$

Ascending order = $\frac{3}{8} < \frac{2}{5} < \frac{9}{11} < \frac{5}{6} < \frac{6}{7}$

14. Write the ratio 5 : 3, 7 : 5 and 6 : 4 in descending order.

- (a) $\frac{5}{3} > \frac{7}{5} > \frac{6}{4}$ (b) $\frac{7}{5} > \frac{6}{4} > \frac{5}{3}$
 (c) $\frac{5}{3} > \frac{6}{4} > \frac{7}{5}$ (d) $\frac{6}{4} > \frac{7}{5} > \frac{5}{3}$

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (c) : From question,

$$\frac{5}{3} = 1.67$$

$$\frac{7}{5} = 1.4$$

$$\frac{6}{4} = 1.5$$

Hence descending order $= \frac{5}{3} > \frac{6}{4} > \frac{7}{5}$

15. Select the option that gives the fractions

$\frac{2}{5}, \frac{1}{3}, \frac{3}{5}, \frac{1}{4}, \frac{7}{10}, \frac{5}{8}$ in ascending order :

(a) $\frac{1}{4}, \frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{7}{10}, \frac{5}{8}$ (b) $\frac{7}{10}, \frac{5}{8}, \frac{3}{5}, \frac{2}{5}, \frac{1}{3}, \frac{1}{4}$

(c) $\frac{1}{4}, \frac{1}{3}, \frac{3}{5}, \frac{2}{5}, \frac{7}{10}, \frac{5}{8}$ (d) $\frac{1}{3}, \frac{1}{4}, \frac{2}{5}, \frac{3}{5}, \frac{7}{10}, \frac{5}{8}$

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (a) : From question

$$\frac{2}{5} = 0.4, \frac{1}{3} = 0.33, \frac{3}{5} = 0.6, \frac{1}{4} = 0.25,$$

$$\frac{7}{10} = 0.7, \frac{5}{8} = 0.625$$

Hence, ascending order of given fractions

$$= \frac{1}{4}, \frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{7}{10}, \frac{5}{8}$$

16. Which among the following is the correct ascending order of the numbers?

(a) $\frac{1}{3}, \frac{4}{15}, 0.33$ (b) $\frac{1}{3}, 0.33, \frac{4}{15}$

(c) $\frac{4}{15}, 0.33, \frac{1}{3}$ (d) $0.33, \frac{4}{15}, \frac{1}{3}$

RRB NTPC 17.01.2017 Shift-1

Ans : (c) From the given fractions,

$$\frac{1}{3} = 0.333, \frac{4}{15} = 0.266 \text{ and } 0.33$$

$$0.266 < 0.33 < 0.333$$

$$\frac{4}{15} < 0.33 < \frac{1}{3}$$

Hence, the required ascending order of the numbers will be $\frac{4}{15}, 0.33, \frac{1}{3}$.

17. Which of the following is correct for the given numbers?

(a) $\frac{13}{21} < \frac{57}{97} < \frac{52}{94} < \frac{36}{79}$

(b) $\frac{36}{79} < \frac{57}{97} < \frac{52}{94} < \frac{13}{21}$

(c) $\frac{36}{79} < \frac{52}{94} < \frac{13}{21} < \frac{57}{97}$

(d) $\frac{36}{79} < \frac{52}{94} < \frac{57}{97} < \frac{13}{21}$

RRB NTPC 02.04.2016 Shift : 1

Ans : (d) From options—

$$\frac{13}{21} = 0.619, \frac{57}{97} = 0.587$$

$$\frac{52}{94} = 0.553, \frac{36}{79} = 0.455$$

Hence, $\frac{36}{79} < \frac{52}{94} < \frac{57}{97} < \frac{13}{21}$ is correct order.

18. Whose ascending order is correct from the given fractions?

(a) $\frac{5}{8}, \frac{19}{24}, \frac{11}{16}$ (b) $\frac{11}{16}, \frac{5}{8}, \frac{19}{24}$

(c) $\frac{5}{8}, \frac{11}{16}, \frac{19}{24}$ (d) $\frac{19}{24}, \frac{11}{16}, \frac{5}{8}$

RRB NTPC 11.04.2016 Shift : 3

Ans : (c) $\frac{5}{8} = 0.625, \frac{19}{24} = 0.791, \frac{11}{16} = 0.687$

Hence, the required ascending order is $0.625 < 0.687 < 0.791$

$$\Rightarrow \frac{5}{8} < \frac{11}{16} < \frac{19}{24}$$

19. The decimal expansion of $\frac{3}{8}$ comes to an end after how many digits after the decimal?

(a) 2 (b) 4
(c) 3 (d) 5

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : $\frac{3}{8} = 0.375$

The decimal expansion of $\frac{3}{8}$ ends after the three digits of decimal.

Type - 3 Problems Based on Finding The Value of The Fraction

20. The decimal expansion of $\frac{31}{2.5}$ will terminate after:

(a) two decimal places
(b) three decimal places
(c) more than three decimal places
(d) one decimal place

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (d) : $\frac{31}{2.5} = \frac{31 \times 10 \times 4}{2.5 \times 10 \times 4} = \frac{1240}{100} = 12.4$

i.e. the decimal expansion of $\frac{31}{2.5}$ will terminate after one decimal place.

21. Which of the following has terminating decimal representation?

(a) $1\frac{1}{5}$ (b) $4\frac{1}{9}$ (c) $3\frac{1}{7}$ (d) $2\frac{1}{3}$

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (a) : If the denominator of the given rational number is 5 then the rational number will represent the terminating decimal.

From options, (a) $1\frac{1}{5} = \frac{6}{5} = 1.2$ (Terminating decimal)

(b) $4\frac{1}{9} = \frac{37}{9} = 4.\bar{1}$ (Non-Terminating decimal)

(c) $3\frac{1}{7} = \frac{22}{7} = 3.142857$ (Non-Terminating decimal)
 (d) $2\frac{1}{3} = \frac{7}{3} = 2.\bar{3}$ (Non-Terminating decimal)

22. Which of the following numbers has a terminating decimal?

$\frac{15}{600}, \frac{29}{343}, \frac{7}{2^2 \times 7^2}, \frac{77}{210}$

(a) $\frac{7}{2^2 \times 7^2}$ (b) $\frac{29}{343}$ (c) $\frac{15}{600}$ (d) $\frac{77}{210}$

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : From options, converting the fractions into decimals,

(a) $\frac{7}{2^2 \times 7^2} = \frac{7}{196} = 0.0357.....$ (Non-Terminating decimal)

(b) $\frac{29}{343} = 0.0845.....$ (Non-Terminating decimal)

(c) $\frac{15}{600} = 0.025$ (Terminating decimal)

(d) $\frac{77}{210} = 0.3\bar{6}$ (Non-Terminating decimal)

Hence, from above $\frac{15}{600}$ is terminating decimal.

23. Simplify $1.4\bar{5} + 0.3\bar{1}2 - 1.1\bar{1}2$.

(a) $\frac{13}{20}$ (b) $\frac{374}{495}$ (c) $\frac{589}{900}$ (d) $\frac{163}{300}$

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (c) : From question,

$$\begin{aligned} & 1.4\bar{5} + 0.3\bar{1}2 - 1.1\bar{1}2 \\ &= 1 + \frac{45}{99} + 0 + \frac{312-3}{990} - \left(1 + \frac{112-11}{900}\right) \\ &= 1 + \frac{5}{11} + \frac{309}{990} - \left(1 + \frac{101}{900}\right) \\ &= 1 + \frac{5}{11} + \frac{103}{330} - \frac{101}{900} \\ &= \frac{5}{11} + \frac{103}{330} - \frac{101}{900} \\ &= \frac{4500 + 3090 - 1111}{9900} \\ &= \frac{6479}{9900} \\ &= \frac{589}{900} \end{aligned}$$

24. Express the decimal number $3.12\bar{7}$ in fraction form

(a) $\frac{281}{900}$ (b) $\frac{563}{180}$ (c) $\frac{180}{563}$ (d) $\frac{365}{180}$

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (b) : $3.12\bar{7}$

$$\begin{aligned} &= 3 + \frac{127-12}{900} = 3 + \frac{115}{900} \\ &3 + \frac{23}{180} = \frac{563}{180} \end{aligned}$$

25. $0.53\bar{2}$ is equivalent to the fraction:

(a) $\frac{572}{990}$ (b) $\frac{527}{990}$ (c) $\frac{537}{990}$ (d) $\frac{32}{99}$

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let $x = 0.53\bar{2}$ (i)

On multiplying by 10 in equation (i),

$$10x = 5.323232 \dots \dots \text{(ii)}$$

Again, multiplying by 100 in equation (ii),

$$1000x = 532.3232 \dots \dots \text{(iii)}$$

On Subtracting equation (ii) from equation (iii),

$$990x = 527$$

$$x = \frac{527}{990}$$

26. Decimal expansion of $\frac{109}{100}$ is:

(a) $1 + \frac{0}{10} + \frac{9}{100}$

(b) $10 + \frac{9}{100}$

(c) $1 + \frac{9}{100}$

(d) $100 + 9 + \frac{0}{100}$

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (a) : Decimal expansion of $\frac{109}{100} = \frac{100}{100} + \frac{0}{10} + \frac{9}{100}$
 $= 1 + \frac{0}{10} + \frac{9}{100}$

Hence, option (a) is required answer.

27. What would be the value of $\frac{1}{0.24}$ part of 1.44.

(a) 140 (b) 12 (c) 166 (d) 6

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : $1.44 \times \frac{1}{0.24}$
 $= \frac{144}{24} = 6$

28. What will be the value if you multiply $\frac{2}{11}$ by the

reciprocal of $-\frac{5}{14}$?

(a) $\frac{28}{55}$ (b) $-\frac{28}{55}$ (c) $\frac{2}{3}$ (d) $-\frac{10}{153}$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (b) : Reciprocal of $-\frac{5}{14} = -\frac{14}{5}$

$\therefore \frac{2}{11} \times \left(-\frac{14}{5}\right) = -\frac{28}{55}$

29. The reciprocal of the sum of the reciprocals of $\frac{5}{7}$ and $\frac{9}{5}$ is:

- (a) $\frac{35}{88}$ (b) $\frac{88}{45}$ (c) $\frac{45}{88}$ (d) $\frac{88}{35}$

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : The sum of reciprocals of $\frac{5}{7}$ and $\frac{9}{5}$

$$= \frac{7}{5} + \frac{5}{9}$$

$$= \frac{63+25}{45} = \frac{88}{45}$$

Hence, the inverse of the sum of reciprocal of $\frac{5}{7}$ and $\frac{9}{5}$

$$= \frac{45}{88}$$

30. Express $0.03\overline{7}$ in the form of $\frac{p}{q}$, where p is a whole number and q is a natural number.

- (a) $\frac{17}{450}$ (b) $\frac{37}{1000}$ (c) $\frac{34}{99}$ (d) $\frac{17}{45}$

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let,

$$x = 0.037 \dots(i)$$

Multiplying by 100 in equation (i),

$$100x = 3.777 \dots(ii)$$

Multiplying by 10 in equation (ii),

$$1000x = 37.777 \dots(iii)$$

Subtracting eqⁿ (ii) from eqⁿ (iii) –

$$900x = 34$$

$$x = \frac{34}{900} = \frac{17}{450}$$

or

$$\frac{p}{q} = \frac{17}{450}$$

31. Correct expression of $0.0234 = ?$

- (a) $\frac{13}{555}$ (b) $2\frac{34}{100}$ (c) $\frac{134}{990}$ (d) $\frac{234}{1000}$

RRB NTPC 07.04.2016 Shift : 2

Ans : (a) From question,

$$0.0234 = \frac{234-0}{9990}$$

$$= \frac{234}{9990} = \frac{78}{3330} = \frac{13}{555}$$

32. The decimal representation of $\frac{5}{100} + \frac{2}{5} - \frac{6}{25}$ is:

- (a) 0.21 (b) 0.35 (c) 0.51 (d) 0.45

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (a) : From question,

$$\frac{5}{100} + \frac{2}{5} - \frac{6}{25}$$

$$= \frac{1}{20} + \frac{2}{5} - \frac{6}{25}$$

$$= \frac{5+40-24}{100}$$

$$= \frac{21}{100} = 0.21$$

33. Which of the following fractions does NOT lie between $\frac{7}{18}$ and $\frac{3}{5}$?

- (a) $\frac{1}{2}$ (b) $\frac{2}{5}$ (c) $\frac{5}{12}$ (d) $\frac{1}{3}$

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,

$$\frac{7}{18} = 0.39 \text{ and } \frac{3}{5} = 0.6$$

From option (d) $\frac{1}{3} = 0.33$

Hence, option (d) does not lie between $\frac{7}{18}$ and $\frac{3}{5}$

34. Which of the following fraction falls between $\frac{3}{4}$ and $\frac{6}{7}$?

- (a) $\frac{11}{9}$ (b) $\frac{9}{10}$ (c) $\frac{5}{9}$ (d) $\frac{9}{11}$

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (d) : The given fractions $\frac{3}{4} = 0.75$

$$\text{and } \frac{6}{7} = 0.857$$

Now from options-

$$(a) \frac{11}{9} = 1.22$$

$$(b) \frac{9}{10} = 0.9$$

$$(c) \frac{5}{9} = 0.55$$

$$(d) \frac{9}{11} = 0.818$$

$\therefore 0.818$ lies between 0.75 and 0.85

Hence, $\frac{9}{11}$ lies between $\frac{3}{4}$ and $\frac{6}{7}$

35. When 0.36 is written in its simplest fractional form, the sum of the numerator and the denominator is:

- (a) 34 (b) 35 (c) 33 (d) 32

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (a) : From question,

$$0.36 = \frac{36}{100} = \frac{9}{25}$$

The sum of the numerator and the denominator of $\frac{9}{25}$

$$= 9 + 25 = 34$$

Type - 4

Problems Based on The Sum and Difference of Fractions

36. Which of the following fractions should be added to $\frac{5}{9}$ to obtain $\frac{11}{6}$ as the sum?

- (a) $1\frac{5}{18}$ (b) $1\frac{1}{3}$ (c) $1\frac{5}{15}$ (d) $1\frac{7}{18}$

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (a) Let the fraction to be added be $\frac{x}{y}$

According to the question,

$$\frac{5}{9} + \frac{x}{y} = \frac{11}{6}$$

$$\frac{x}{y} = \frac{11}{6} - \frac{5}{9}$$

$$\frac{x}{y} = \frac{33-10}{18}$$

$$\frac{x}{y} = \frac{23}{18}$$

$$\text{or } \frac{x}{y} = 1\frac{5}{18}$$

37. What is the difference between the biggest and the smallest fraction among $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}$ and $\frac{5}{6}$?

- (a) $\frac{1}{30}$ (b) $\frac{1}{6}$ (c) $\frac{1}{12}$ (d) $\frac{1}{20}$

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (b) : $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$

For equaling denominator we have to multiply and divide each fraction by LCM of 3, 4, 5 and 6 = 60.

$$\Rightarrow \frac{2}{3} \times \frac{60}{60}, \frac{3}{4} \times \frac{60}{60}, \frac{4}{5} \times \frac{60}{60}, \frac{5}{6} \times \frac{60}{60}$$

$$\Rightarrow \frac{40}{60}, \frac{45}{60}, \frac{48}{60}, \frac{50}{60}$$

$$\text{Hence, biggest fraction} = \frac{5}{6}$$

$$\text{Smallest fraction} = \frac{2}{3}$$

$$\text{Required difference} = \frac{5}{6} - \frac{2}{3} = \frac{1}{6}$$

38. Find the sum of $\frac{5}{2}$ and $\frac{2}{5}$.

- (a) $\frac{10}{7}$ (b) $\frac{29}{10}$ (c) $\frac{20}{7}$ (d) $\frac{7}{7}$

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (b) : Required sum = $\frac{5}{2} + \frac{2}{5} = \frac{25+4}{10}$
 $= \frac{29}{10}$

39. The sum of $\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \dots + \frac{1}{n(n+1)}$ is:

- (a) $\frac{n+1}{n}$ (b) $\frac{n(n+1)}{2}$
 (c) $\frac{n+1}{2n}$ (d) $\frac{n}{n+1}$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (d) : $\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \dots + \frac{1}{n(n+1)}$
 $= \frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \dots + \frac{1}{n(n+1)}$
 $= \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \dots + \frac{1}{n} - \frac{1}{(n+1)}$
 $= \frac{1}{1} - \frac{1}{(n+1)}$
 $= \frac{n+1-1}{n+1} = \frac{n}{n+1}$

40. Find the number obtained by adding the sum and difference of the numbers 3.03 and 2.05.

- (a) 0.606 (b) 6.06
 (c) 600.6 (d) 60.06

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (b) : $3.03 + 2.05 = 5.08$

$$3.03 - 2.05 = 0.98$$

$$+ 6.06$$

41. What should be subtracted from $\left(\frac{3}{4} - \frac{2}{3}\right)$ to get

$$-\frac{1}{6}?$$

- (a) $\frac{2}{4}$ (b) $1\frac{1}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (c) : Let, the number x to be subtracted be x

$$\left(\frac{3}{4} - \frac{2}{3}\right) - x = -\frac{1}{6}$$

$$\left(\frac{9-8}{12}\right) - x = -\frac{1}{6}$$

$$\left(\frac{1}{12}\right) - x = -\frac{1}{6}$$

$$\frac{1}{12} + \frac{1}{6} = x \Rightarrow \frac{1+2}{12}$$

$$x = \frac{3}{12} \Rightarrow x = \frac{1}{4}$$

42. What number must be subtracted from both the numerator and denominator of the fraction $\frac{15}{19}$ so as to make it $\frac{3}{4}$?
- (a) 5 (b) 9 (c) 6 (d) 3

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the fraction become $\frac{3}{4}$ on subtracting the number x from the numerator and denominator.
According to the question,
On subtracting x in both numerator and denominator of $\frac{15}{19}$

$$\frac{15-x}{19-x} = \frac{3}{4}$$

$$60 - 4x = 57 - 3x$$

$$x = 3$$

Required number $x = 3$

43. What number must be subtracted from both the denominator and numerator of the fraction $\frac{42}{45}$ so that it becomes $\frac{5}{6}$?
- (a) 27 (b) 25 (c) 13 (d) 12

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let that number be
According to the question,

$$\frac{42-x}{45-x} = \frac{5}{6}$$

$$252 - 6x = 225 - 5x$$

$$252 - 225 = 6x - 5x$$

$$x = 27$$

Hence the number to be subtracted from the numerator and denominator of the fraction $\frac{42}{45} = 27$

44. What smallest fraction should be added to $3\frac{2}{3} + 6\frac{7}{12} + 4\frac{9}{36} + 5 + 7\frac{1}{12}$ to make the sum a whole number?
- (a) $\frac{7}{12}$ (b) $\frac{11}{12}$ (c) $\frac{5}{12}$ (d) $\frac{13}{12}$

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (c) : From question,

$$3\frac{2}{3} + 6\frac{7}{12} + 4\frac{9}{36} + 5 + 7\frac{1}{12}$$

$$= \frac{2}{3} + \frac{7}{12} + \frac{9}{36} + \frac{1}{12} + (3+6+4+5+7)$$

$$= \frac{24+21+9+3}{36} + 25$$

$$= \frac{57}{36} + 25$$

From option (c),

$$\frac{5}{12} + \frac{57}{36} + 25$$

$$= \frac{15+57}{36} + 25$$

$$= \frac{72}{36} + 25$$

$$= 2 + 25 = 27$$

Hence, the sum obtained by adding $\frac{5}{12}$ will become a whole number.

45. Find out the fraction which when add $\frac{1}{2}$ to get 2?

- (a) $\frac{1}{2}$ (b) $\frac{1}{-1}$ (c) $\frac{3}{2}$ (d) $\frac{5}{3}$

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the fraction be $\frac{x}{y}$

According to the question,

$$\frac{1}{2} + \frac{x}{y} = 2$$

$$\frac{x}{y} = 2 - \frac{1}{2}$$

$$\frac{x}{y} = \frac{3}{2}$$

Hence, the fraction will be $\frac{3}{2}$.

Type - 5 Miscellaneous

46. Which fraction bears the same ratio to $\frac{1}{27}$ as $\frac{3}{11}$ does to $\frac{5}{9}$?

- (a) $\frac{1}{99}$ (b) $\frac{1}{27}$ (c) $\frac{1}{55}$ (d) $\frac{1}{15}$

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let the fraction = $\frac{x}{y}$

According to the question -

$$\frac{x}{y} : \frac{1}{27}$$

$$27x : y \quad \dots(i)$$

$$\frac{3}{11} : \frac{5}{9}$$

$$27 : 55 \quad \dots(ii)$$

On comparing eqⁿ (i) and (ii),
 $x = 1$, $y = 55$

Hence, the fraction = $\frac{1}{55}$

47. The numerator of a fraction is 2 less than the denominator. If the numerator is multiplied by 2 and the denominator is multiplied by 3, then the fraction becomes $\frac{2}{9}$. The fraction is:

- (a) $\frac{5}{7}$ (b) $\frac{3}{5}$ (c) $\frac{7}{9}$ (d) $\frac{1}{3}$

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (d) : Let the numerator of fraction be x

Denominator = $x + 2$

According to the question,

$$\frac{x \times 2}{3(x+2)} = \frac{2}{9}$$

$$\frac{x}{3x+6} = \frac{1}{9}$$

$$9x = 3x + 6$$

$$x = 1$$

$$\text{Fraction} = \frac{x}{x+2} = \frac{1}{3}$$

48. The sum of the numerator and denominator of a fraction is 11. If the numerator is decreased by 1, the fraction becomes $\frac{1}{4}$. Find the fraction.

- (a) $\frac{2}{9}$ (b) $\frac{3}{8}$ (c) $\frac{4}{7}$ (d) $\frac{5}{6}$

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let the fraction $\frac{x}{y}$

According question,

$$x+y=11 \text{ ----- (i)}$$

$$\text{and } \frac{x-1}{y} = \frac{1}{4}$$

$$\Rightarrow 4x-y=4 \text{ ----- (ii)}$$

From equation (i) + equation (ii)

$$5x=15$$

$$x=3$$

$$y=8 \quad (\text{From equation (i)})$$

$$\text{Hence, fraction} = \frac{x}{y} = \frac{3}{8}$$

49. The numerator of a fraction is less than its denominator by 2. If we subtract 2 from the numerator and add 2 to the denominator, then the new fraction is $\frac{1}{3}$ what is the original fraction?

- (a) $\frac{5}{7}$ (b) $\frac{5}{9}$ (c) $\frac{1}{3}$ (d) $\frac{3}{7}$

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let the denominator of a fraction be x .

and numerator = $x - 2$

According to the question,

$$\frac{(x-2)-2}{x+2} = \frac{1}{3}$$

$$\frac{x-4}{x+2} = \frac{1}{3}$$

$$3(x-4) = (x+2)$$

$$3x-12 = x+2$$

$$2x = 14$$

$$x = 7$$

$$\text{Original fraction} = \frac{x-2}{x} = \frac{7-2}{7} = \frac{5}{7}$$

50. $\frac{4}{5}\%$ is equivalent to which of the following fractions?

- (a) $\frac{1}{25}$ (b) $\frac{1}{125}$ (c) $\frac{1}{725}$ (d) $\frac{4}{125}$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

$$\text{Ans. (b) : } \frac{4}{5}\% = \frac{4}{5} \times \frac{1}{100} = \frac{1}{125}$$

$$\text{Hence required fraction} = \frac{1}{125}$$

51. The numerator of a fraction is 5 less than its denominator. If 2 is subtracted from the numerator and 2 is added to the denominator, the fraction becomes $\frac{2}{5}$ find the original fraction.

- (a) $\frac{9}{11}$ (b) $\frac{11}{13}$ (c) $\frac{5}{7}$ (d) $\frac{8}{13}$

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the numerator of a fraction be = a
denominator = $a + 5$

According to the question,

$$\frac{a-2}{a+5+2} = \frac{2}{5}$$

$$5a-10=2a+14$$

$$3a=24 \Rightarrow a=8$$

$$\therefore \text{Original fraction} = \frac{a}{a+5} = \frac{8}{13}$$

52. Three friends arranged a party. Tanveer paid $\frac{2}{3}$ as much as Yusuf paid. Yusuf paid $\frac{1}{2}$ as much as Sachin paid. The fraction of the total expenditure by Yusuf was.

- (a) $\frac{7}{11}$ (b) $\frac{5}{11}$ (c) $\frac{3}{11}$ (d) $\frac{2}{11}$

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (c) : Tanveer Yusuf Sachin

$$2 : 3 :$$

$$\frac{1}{2} : \frac{2}{3}$$

$$2 : 3 : 6$$

$$\therefore \text{Total expenditure by Yusuf} = \frac{3}{(2+3+6)} = \frac{3}{11}$$

53. A tennis player won 5 matches, lost 12 matches and draw 3 matches in his career. The fraction of matches which lost in his career is.

- (a) $\frac{12}{5}$ (b) $\frac{2}{5}$ (c) $\frac{1}{5}$ (d) $\frac{3}{5}$

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : Number of matches won by the player = 5

Number of matches lost by the player = 12

Match draw = 3

Number of total matches = $5 + 12 + 3 = 20$

$$\text{Hence, fraction of the lost matches} = \frac{12}{20} = \frac{3}{5}$$

54. If the numerator of a fraction is decreased by 80% and the denominator of the fraction is decreased by 60%, then the resultant fraction is $\frac{5}{6}$. What is the original fraction?

- (a) $\frac{7}{3}$ (b) $\frac{3}{5}$ (c) $\frac{5}{3}$ (d) $\frac{6}{5}$

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let original fraction is $\frac{x}{y}$

According to the question,

$$\frac{x \times \frac{20}{100}}{y \times \frac{40}{100}} = \frac{5}{6}$$

$$\frac{x}{2 \times y} = \frac{5}{6}$$

$$\frac{x}{y} = \frac{5}{3}$$

Hence original fraction = $\frac{x}{y} = \frac{5}{3}$

55. 200 g as a fraction of 1 kg is:

- (a) $\frac{1}{10}$ (b) $\frac{3}{10}$ (c) $\frac{2}{5}$ (d) $\frac{1}{5}$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question—

$$200\text{g} = \frac{200}{1000}\text{kg} = \frac{1}{5}\text{kg}$$

Therefore, 200g is a $\frac{1}{5}$ part of 1 kg.

56. Which of the following number is closest to zero?

- (a) $(1-0.09)^2$ (b) $1-(0.09)^2$
(c) 0.009 (d) $(0.09)^2$

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (d) : From the given options—

- (a) $(1-0.09)^2$
 $1+0.0081-0.18$
 $=0.8281$
(b) $1-(0.09)^2$
 $1-0.0081$
 $=0.9919$
(c) 0.009
(d) $(0.09)^2$
 $=0.0081$

Hence, option (d) is closest to zero.

57. If 58 out of 100 students in a school are boys, then express the part of the school that consists of boys in decimals.

- (a) 0.5 (b) 0.58 (c) 0.8 (d) 0.85

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (b) : Hence, the part of the school that consists of boys in decimals = $\frac{58}{100} = 0.58$

58. When the numerator of a fraction increases by 6, the fraction increases by three-fourth. The denominator of the fraction is :

- (a) 8 (b) 10 (c) 12 (d) 6

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the fraction be $\frac{x}{y}$

According to the question,

$$\Rightarrow \frac{x+6}{y} = \frac{x}{y} + \frac{3}{4}$$

$$\Rightarrow \frac{x+6}{y} - \frac{x}{y} = \frac{3}{4}$$

$$\Rightarrow \frac{6}{y} = \frac{3}{4}$$

$$\Rightarrow y = 8$$

59. How many equivalent fraction can be formed by any fraction?

- (a) Only 2 (b) Only 3
(c) Infinite (d) Only 1

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (c) : From a given fraction, infinite equivalent fraction can be formed.

60. If we increase 50% of the numerator and 80% of the denominator of a fraction, then what fraction of the original will be the new fraction.

- (a) $\frac{7}{9}$ (b) $\frac{6}{5}$ (c) $\frac{5}{8}$ (d) $\frac{5}{6}$

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the fraction be = $\frac{x}{y}$

According to the question,

$$\text{The fraction will be} = \frac{x \times 150}{y \times 180}$$

$$= \frac{5x}{6y}$$

It is clear that new fraction is $\frac{5}{6}$ of the original fraction.

61. Saniya won 18 games out of 27 games played. Calculate the games lost in terms of decimal.

- (a) 0.333 (b) 0.033
(c) 0.50 (d) 0.667

RRB NTPC 12.04.2016 Shift : 1

Ans : (a)

$$\text{The number of games lost} = \frac{27-18}{27}$$

$$= \frac{9}{27} = \frac{1}{3} = 0.333$$

Surds and Indices

Type - 1 Problems Based on Square, Square Root and Surds

1. Find the value of $5\sqrt{12} + 6\sqrt{27} - 4\sqrt{75} + \sqrt{192}$

- (a) $20\sqrt{3}$ (b) $22\sqrt{3}$
(c) $18\sqrt{3}$ (d) $16\sqrt{3}$

RRB NTPC (Stage-2) 17/06/2022 (Shift-I)

$$\begin{aligned}\text{Ans. (d) : } & 5\sqrt{12} + 6\sqrt{27} - 4\sqrt{75} + \sqrt{192} \\ &= 5\sqrt{4 \times 3} + 6\sqrt{9 \times 3} - 4\sqrt{25 \times 3} + \sqrt{64 \times 3} \\ &= 5 \times 2\sqrt{3} + 6 \times 3\sqrt{3} - 4 \times 5\sqrt{3} + 8\sqrt{3} \\ &= \sqrt{3}(10 + 18 - 20 + 8) \\ &= \sqrt{3}(16) \\ &= 16\sqrt{3}\end{aligned}$$

2. Find the positive value of

$$\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \dots + \frac{1}{\sqrt{15}+\sqrt{16}}$$

(a) 1 (b) 3 (c) 4 (d) 2

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

$$\begin{aligned}\text{Ans. (b) : } & \frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \dots + \frac{1}{\sqrt{15}+\sqrt{16}} \\ &= \frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + \dots + \frac{1}{\sqrt{16}+\sqrt{15}}\end{aligned}$$

After rationalizing the denominator

$$\begin{aligned}&= \frac{\sqrt{2}-1}{2-1} + \frac{\sqrt{3}-\sqrt{2}}{3-2} + \frac{\sqrt{4}-\sqrt{3}}{4-3} + \dots + \frac{\sqrt{16}-\sqrt{15}}{16-15} \\ &= \sqrt{2}-1 + \sqrt{3}-\sqrt{2} + \sqrt{4}-\sqrt{3} + \dots + \sqrt{16}-\sqrt{15} \\ &= -1 + \sqrt{16} = -1 + 4 = 3\end{aligned}$$

3. What is the value of the following expression?

$$\frac{\sqrt{225}}{14} \times \frac{\sqrt{196}}{22} \times \frac{\sqrt{484}}{15}$$

(a) 14 (b) 1 (c) 2 (d) 3

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

$$\begin{aligned}\text{Ans. (b) : } &= \frac{\sqrt{225}}{14} \times \frac{\sqrt{196}}{22} \times \frac{\sqrt{484}}{15} \\ &= \frac{15}{14} \times \frac{14}{22} \times \frac{22}{15} \\ &= 1\end{aligned}$$

4. The value of $\sqrt{0.04} + \sqrt{1.44} + \sqrt{1.69} + \sqrt{0.0009}$ is:

- (a) 10.3 (b) 1.70 (c) 2.03 (d) 2.73

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

$$\begin{aligned}\text{Ans. (d) : } & \sqrt{0.04} + \sqrt{1.44} + \sqrt{1.69} + \sqrt{0.0009} \\ &= 0.2 + 1.2 + 1.3 + 0.03 \\ &= 2.73\end{aligned}$$

5. The value of $\sqrt{10+\sqrt{221}} + \sqrt{12+\sqrt{16}}$ is :

- (a) 3 (b) 5 (c) 4 (d) 6

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

$$\begin{aligned}\text{Ans. (b) : } & \sqrt{10+\sqrt{221}} + \sqrt{12+\sqrt{16}} \\ &= \sqrt{10+\sqrt{221}} + \sqrt{12+4} \\ &= \sqrt{10+\sqrt{221+4}} \\ &= \sqrt{10+15} \\ &= 5\end{aligned}$$

6. Evaluate the following.

$$\frac{2+\sqrt{5}}{2-\sqrt{5}} + \frac{2-\sqrt{5}}{2+\sqrt{5}} + \frac{\sqrt{5}-1}{\sqrt{5}+1}$$

- (a) $\frac{-35-\sqrt{5}}{2}$ (b) $\frac{-32-\sqrt{5}}{2}$
(c) $\frac{-31-\sqrt{5}}{2}$ (d) $\frac{-33-\sqrt{5}}{2}$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

$$\begin{aligned}\text{Ans. (d) : } & \frac{2+\sqrt{5}}{2-\sqrt{5}} + \frac{2-\sqrt{5}}{2+\sqrt{5}} + \frac{\sqrt{5}-1}{\sqrt{5}+1} \\ &= \frac{(2+\sqrt{5})^2 + (2-\sqrt{5})^2}{4-5} + \frac{\sqrt{5}-1}{\sqrt{5}+1} \\ &= \frac{4+5+4\sqrt{5}+4+5-4\sqrt{5}}{-1} + \frac{\sqrt{5}-1}{\sqrt{5}+1} \\ &= -18 + \frac{\sqrt{5}-1}{\sqrt{5}+1} \times \frac{\sqrt{5}-1}{\sqrt{5}-1} \\ &= -18 + \frac{6-2\sqrt{5}}{4} \\ &= -18 + \frac{3-\sqrt{5}}{2} \\ &= \frac{-36+3-\sqrt{5}}{2} \\ &= \frac{-33-\sqrt{5}}{2}\end{aligned}$$

7. Find the positive value of the following square root.

$$\sqrt{56 + \sqrt{56 + \sqrt{56 + \dots}}} = ?$$

- (a) 12 (b) 4 (c) 56 (d) 8

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (d) : Let-

$$x = \sqrt{56 + \sqrt{56 + \sqrt{56 + \dots}}} \quad \text{--- (i)}$$

On Squaring the both sides,

$$x^2 = 56 + \sqrt{56 + \sqrt{56 + \sqrt{56 + \dots}}}$$

$$x^2 = 56 + x \quad \{\text{from eqn. (i)}\}$$

$$x^2 - x - 56 = 0$$

$$x^2 - 8x + 7x - 56 = 0$$

$$x(x - 8) + 7(x - 8) = 0$$

$$(x - 8)(x + 7) = 0$$

$$x - 8 = 0$$

$$x = 8 \quad (\text{positive value})$$

8. If $P = 2 + \sqrt{3}$, $Q = 2 - \sqrt{3}$ then find the value of

$$\frac{P}{Q}$$

- (a) $4\sqrt{3} - 5$ (b) $7 - 2\sqrt{6}$
(c) $4\sqrt{6} + 5$ (d) $\frac{7 + 4\sqrt{3}}{1}$

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$P = 2 + \sqrt{3}$$

$$Q = 2 - \sqrt{3}$$

$$\frac{P}{Q} = \frac{2 + \sqrt{3}}{2 - \sqrt{3}} \times \frac{(2 + \sqrt{3})}{(2 + \sqrt{3})}$$

$$= \frac{(2 + \sqrt{3})^2}{(2)^2 - (\sqrt{3})^2}$$

$$= \frac{4 + 3 + 4\sqrt{3}}{4 - 3}$$

$$= \frac{7 + 4\sqrt{3}}{1}$$

9. Solve the following -

$$\sqrt[3]{\sqrt{0.000064}} = ?$$

- (a) 2.0 (b) 0.02 (c) 0.002 (d) 0.2

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

$$\text{Ans. (d) : } \sqrt[3]{\sqrt{0.000064}} = \sqrt[3]{\sqrt{0.008 \times 0.008}}$$

$$= \sqrt[3]{0.008}$$

$$= \sqrt[3]{0.2 \times 0.2 \times 0.2}$$

$$= \left[(0.2)^3\right]^{\frac{1}{3}} = 0.2$$

10. The mixes surds form of $\sqrt{1350}$ is:

- (a) $14\sqrt{6}$ (b) $13\sqrt{6}$ (c) $12\sqrt{6}$ (d) $15\sqrt{6}$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (d) : From question,

$$\sqrt{1350} = \sqrt{2 \times 3 \times 3 \times 3 \times 5 \times 5}$$

$$= 15\sqrt{6}$$

11. Find the value of $\sqrt{2025}$.

- (a) 65 (b) 25 (c) 55 (d) 45

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$\sqrt{2025}$$

$$= \sqrt{45 \times 45}$$

$$= 45$$

12. The value of square root of 90 will lie between.....

- (a) 9 and 10 (b) 10 and 11
(c) 8 and 9 (d) 7 and 8

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (a) : From option (a)

$$\text{Square of } 9 = 81$$

$$\text{Square of } 10 = 100$$

It is clear that the square root of 90 will lie between 9 and 10.

$$\sqrt{90} = 9.487$$

13. The value of $\sqrt{4}$ is

- (a) 4 (b) 2 or -2
(c) Only 2 (d) Only -2

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,

$$a = \sqrt{4}$$

$$a = \pm 2$$

$$a = 2 \text{ or } -2$$

14. Solve the given equation

$$\sqrt{(544)^2 - (256)^2} = ?$$

- (a) 144 (b) 480 (c) 288 (d) 400

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

$$\text{Ans. (b) : } \sqrt{(544)^2 - (256)^2} = ?$$

$$\text{Let } ? = x$$

$$\sqrt{(544)^2 - (256)^2} = x$$

On Taking both side square.

$$(544)^2 - (256)^2 = x^2 \quad [a^2 - b^2 = (a + b)(a - b)]$$

$$800 \times 288 = x^2$$

$$100 \times 2304 = x^2$$

$$x = 480$$

15. The value of $\sqrt{142884}$ is

- (a) 368 (b) 388 (c) 378 (d) 358

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (c) :

$$x = \sqrt{142884}$$

$$x^2 = 378 \times 378$$

$$x^2 = (378)^2$$

$$\boxed{x = 378}$$

Second Method

$$\begin{array}{r} 378 \\ 3 \overline{) 142884} \\ \underline{9} \\ 528 \\ 67 \overline{) 528} \\ \underline{469} \\ 5984 \\ 748 \overline{) 5984} \\ \underline{5984} \\ 0 \end{array}$$

16. The square root of 18769 consists of how many digits?

(a) 2 (b) 3 (c) 4 (d) 5

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\begin{array}{r} 137 \\ 1 \overline{) 18769} \\ \underline{1} \\ 23 \times 87 \\ 3 69 \\ 267 1869 \\ 7 1869 \\ \underline{ 0000} \\ 0 \end{array}$$

$$= 137$$

Hence square root of 18769 consists of 3 digits.

17. Simplify.

$$4\sqrt{0.000081}$$

(a) 0.36 (b) 0.036
(c) 0.0036 (d) 0.0018

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

$$\text{Ans. (b) : } 4\sqrt{0.000081} = 4 \times 0.009 = 0.036$$

18. Find the square root of 42.25.

(a) 7.5 (b) 4.5 (c) 6.5 (d) 5.5

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (c) : From question,

$$x = 42.25$$

$$\sqrt{x} = \sqrt{\frac{4225}{100}} = \frac{65}{10} = \frac{13}{2} = 6.5$$

19. The value of $\sqrt{0.0144}$ is:

(a) 0.12 (b) 0.012
(c) 1.2 (d) 0.0012

RRB NTPC 27.04.2016 Shift : 1

Ans : (a) On finding the square root of 0.0144 by division method,

$$\begin{array}{r} 0.12 \\ 1 \overline{) 0.0144} \\ \underline{1} \\ 22 44 \\ +2 44 \\ \underline{ 00} \\ 0 \end{array}$$

Hence, the square root of 0.0144 = $\sqrt{0.0144} = 0.12$

20. Simplify the following expression.

$$\sqrt{12.5 \times 8 \times 1.44}$$

(a) 13 (b) 12 (c) 15 (d) 10

RRB NTPC (Stage-2) 16/06/2022 (Shift-I)

Ans. (b) : $\sqrt{12.5 \times 8 \times 1.44}$

$$\begin{aligned} &= \sqrt{\frac{125}{10} \times \frac{144}{100} \times 8} \\ &= \sqrt{\frac{5 \times 5 \times 5 \times 12 \times 12 \times 2 \times 2 \times 2}{10 \times 100}} \\ &= \frac{5 \times 12 \times 2}{10} \\ &= 12 \end{aligned}$$

21. What is the value of x, if

$$-3 \times \sqrt{196} + \sqrt{x} = 8 \times 3 - 2$$

(a) 1064 (b) 135 (c) 128 (d) 4096

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$-3 \times \sqrt{196} + \sqrt{x} = 8 \times 3 - 2$$

$$-3 \times 14 + \sqrt{x} = 24 - 2$$

$$-42 + \sqrt{x} = 22$$

$$\sqrt{x} = 22 + 42$$

$$\sqrt{x} = 64$$

On squaring of both sides,

$$(\sqrt{x})^2 = (64)^2$$

$$x = 64 \times 64$$

$$x = 4096$$

22. If $x\sqrt{12} = 4 + x\sqrt{3}$, then the value of x is .

(a) $\sqrt{3}$ (b) $\frac{4}{\sqrt{3}}$ (c) $2\sqrt{3}$ (d) $-\sqrt{3}$

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\Rightarrow x\sqrt{12} = 4 + x\sqrt{3}$$

$$\Rightarrow 2x\sqrt{3} = 4 + x\sqrt{3}$$

$$\Rightarrow x(2\sqrt{3} - \sqrt{3}) = 4$$

$$x = \frac{4}{\sqrt{3}}$$

23. The value of $\sqrt{72 \times 18} + \sqrt{0.04} + \sqrt{0.64}$ will be equal to

(a) 24 (b) 12 (c) 36 (d) 37

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : $\sqrt{72 \times 18} + \sqrt{0.04} + \sqrt{0.64}$
 $= \sqrt{9 \times 8 \times 2 \times 9} + 0.2 + 0.8$
 $= 9 \times 4 + 1$
 $= 36 + 1$
 $= 37$

24. If $\sqrt{(2116 \times \sqrt{48 \div x})} = 92$, find the value of x.

- (a) 6 (b) 2 (c) 12 (d) 3

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (d) : $\sqrt{2116 \times \sqrt{48 \div x}} = 92$
On squaring of both sides,

$$2116 \times \sqrt{\frac{48}{x}} = 92 \times 92$$

$$\frac{48}{x} = 4 \times 4$$

$$\frac{x}{x} = 3$$

25. If $\sqrt{225} = 15$ then the value of $\sqrt{2.25} + \sqrt{0.0225} + \sqrt{0.000225}$ is:

- (a) 1.645 (b) 1.689
(c) 1.665 (d) 1.675

RRB NTPC 13.03.2021 (Shift-I) Stage I

Ans. (c) : Given,
 $\sqrt{225} = 15$

The value of $\sqrt{2.25} + \sqrt{0.0225} + \sqrt{0.000225}$
 $= 1.5 + 0.15 + 0.015$
 $= 1.665$

26. If $\sqrt{1225 \times \sqrt{32 \div x}} = 70$, find the value of x.

- (a) 16 (b) 4 (c) 8 (d) 2

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (d) : Given,

$\sqrt{1225 \times \sqrt{32 \div x}} = 70$
On squaring the both sides,
 $1225 \times \sqrt{32 \div x} = 4900$
Again on squaring the both sides,

$$(1225)^2 \times 32 \div x = (4900)^2$$

$$x = \frac{(1225)^2}{(4900)^2} \times 32$$

$$x = \frac{48020000}{24010000}$$

$$x = 2$$

27. If $\sqrt{2916} = 54$ then what is the value of the following?

- $\sqrt{29.16} + \sqrt{0.2916} + \sqrt{0.002916} + \sqrt{0.00002916}$
(a) 5.9994 (b) 5.90
(c) 6.00 (d) 5.999

RRB NTPC 01.02.2021 (Shift-II) Stage I

Ans. (a) Given, $\sqrt{2916} = 54$

Then, $\sqrt{29.16} + \sqrt{0.2916} + \sqrt{0.002916} + \sqrt{0.00002916}$
 $= 5.4 + 0.54 + 0.054 + 0.0054 = 5.9994$

28. If $\sqrt{15} = 3.88$, then $\sqrt{\frac{5}{3}} = ?$

- (a) $4.29\bar{3}$ (b) $2.29\bar{3}$
(c) $3.29\bar{3}$ (d) $1.29\bar{3}$

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given, $\sqrt{15} = 3.88$

$$\Rightarrow \sqrt{\frac{5}{3}} = \frac{\sqrt{5}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

(on Multiplying by $\sqrt{3}$ in numerator and denominator)

$$\Rightarrow \frac{\sqrt{15}}{3} = \frac{3.88}{3} = 1.29\bar{3}$$

29. If $\frac{3\sqrt{5}-5}{3\sqrt{5}+5} = a+b\sqrt{5}$, then find the value of b.

- (a) $\frac{7}{2}$ (b) $\frac{2}{3}$ (c) $-\frac{3}{2}$ (d) $\frac{3\sqrt{5}}{2}$

RRB NTPC 28.01.2021 (Shift-I) Stage I

Ans. (c) :

$$\frac{3\sqrt{5}-5}{3\sqrt{5}+5} = a+b\sqrt{5}$$

$$\text{L.H.S} = \frac{3\sqrt{5}-5}{3\sqrt{5}+5} = \frac{3\sqrt{5}-5}{3\sqrt{5}+5} \times \frac{3\sqrt{5}-5}{3\sqrt{5}-5} = \frac{(3\sqrt{5}-5)^2}{45-25}$$

$$= \frac{45+25-30\sqrt{5}}{20} = \frac{70-30\sqrt{5}}{20} = \frac{7-3\sqrt{5}}{2}$$

$$= \frac{7}{2} - \frac{3}{2}\sqrt{5}$$

Hence, on comparing the L.H.S. from R.H.S.,

$$b = -\frac{3}{2}$$

30. If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ then $3(x+y) = ?$

- (a) 13 (b) 8 (c) 12 (d) 10

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (c) : $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}, y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$

$$3(x+y) = 3 \left(\frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{\sqrt{3}-1}{\sqrt{3}+1} \right)$$

$$= 3 \left(\frac{3+1+2\sqrt{3}+3+1-2\sqrt{3}}{2} \right)$$

$$= 12$$

31. The value of $(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})$ is equal to:

- (a) -1 (b) 2 (c) 3 (d) -3

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (a) : $(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})$

We know that,
 $\therefore (a+b)(a-b) = a^2 - b^2$
 $\therefore (\sqrt{2})^2 - (\sqrt{3})^2$
 $= 2 - 3$
 $= -1$

32. If $\sqrt{54} + \sqrt{150} = 19.60$, then what will be the value of $\sqrt{216} + \sqrt{96}$ be? Give your answer, correct to one decimal place.

(a) 24.6 (b) 24.5 (c) 17.7 (d) 23.9

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given, $\sqrt{54} + \sqrt{150} = 19.60$

$$3\sqrt{6} + 5\sqrt{6} = 19.60$$

$$8\sqrt{6} = 19.60$$

$$\sqrt{6} = 2.45$$

$$\therefore \sqrt{216} + \sqrt{96} = 6\sqrt{6} + 4\sqrt{6}$$

$$= 10\sqrt{6}$$

$$= 10 \times 2.45$$

$$= 24.5$$

33. If $x = \frac{1}{\sqrt{2} + 1}$, then what will be the value of $x+1$?

(a) $\sqrt{2}$ (b) 2 (c) $\sqrt{2} + 1$ (d) $\sqrt{2} - 1$

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (a) : $x = \frac{1}{\sqrt{2} + 1}$

$$x+1 = \frac{1}{\sqrt{2} + 1} + 1$$

$$= \frac{1 + \sqrt{2} + 1}{\sqrt{2} + 1} = \frac{2 + \sqrt{2}}{\sqrt{2} + 1}$$

$$= \frac{\sqrt{2}(\sqrt{2} + 1)}{\sqrt{2} + 1} = \sqrt{2}$$

34. if $\frac{2\sqrt{2} + \sqrt{7}}{2\sqrt{2} - \sqrt{7}} = x + y\sqrt{14}$, find the value of y.

(a) 15 (b) 0 (c) 19 (d) 4

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (d) : $\frac{2\sqrt{2} + \sqrt{7}}{2\sqrt{2} - \sqrt{7}} = x + y\sqrt{14}$

$$\frac{2\sqrt{2} + \sqrt{7}}{2\sqrt{2} - \sqrt{7}} \times \frac{2\sqrt{2} + \sqrt{7}}{2\sqrt{2} + \sqrt{7}} = x + y\sqrt{14}$$

$$\frac{(2\sqrt{2} + \sqrt{7})^2}{(2\sqrt{2})^2 - (\sqrt{7})^2} = x + y\sqrt{14}$$

$$\frac{8 + 7 + 4\sqrt{14}}{8 - 7} = x + y\sqrt{14}$$

$$15 + 4\sqrt{14} = x + y\sqrt{14}$$

On comparing the both sides,

$$x = 15$$

$$y = 4$$

35. If $\sqrt{45} + \sqrt{125} = 17.88$ then what will be the value of $\sqrt{180} + \sqrt{80}$?

(a) 13.4 (b) 21.6 (c) 22.35 (d) 22.2

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$\sqrt{45} + \sqrt{125} = 17.88$$

$$= 3\sqrt{5} + 5\sqrt{5} = 17.88$$

$$= 8\sqrt{5} = 17.88$$

$$\sqrt{5} = \frac{17.88}{8} \quad \dots\dots\dots (i)$$

then $\sqrt{180} + \sqrt{80} = 6\sqrt{5} + 4\sqrt{5} = 10\sqrt{5}$

From equation (i)

$$\therefore 10\sqrt{5} = \frac{17.88}{8} \times 10 = 22.35$$

36. Simplify -

$$4\sqrt{18} + 7\sqrt{32} - 2\sqrt{50}$$

(a) $30\sqrt{2}$ (b) $32\sqrt{3}$ (c) $36\sqrt{2}$ (d) $30\sqrt{3}$

RRB NTPC 04.04.2016 Shift : 1

Ans : (a) Given expression,

$$4\sqrt{18} + 7\sqrt{32} - 2\sqrt{50}$$

$$= 4\sqrt{3 \times 3 \times 2} + 7\sqrt{4 \times 4 \times 2} - 2\sqrt{5 \times 5 \times 2}$$

$$= 12\sqrt{2} + 28\sqrt{2} - 10\sqrt{2}$$

$$= 30\sqrt{2}$$

37. If $\sqrt{x^2 + y^2} = 25$ and $y = 2x$ then find the value of x.

(a) 5 (b) 25 (c) $\sqrt{125}$ (d) $\sqrt{5}$

RRB NTPC 28.03.2016 Shift : 2

Ans : (c) $\sqrt{x^2 + y^2} = 25, y = 2x$

$$\sqrt{x^2 + y^2} = 25 \quad \dots\dots\dots (i)$$

On squaring equation (i),

$$x^2 + y^2 = 625$$

$$x^2 + (2x)^2 = 625 \quad (\because y = 2x)$$

$$x^2 + 4x^2 = 625$$

$$5x^2 = 625$$

$$x^2 = 125$$

$$x = \sqrt{125}$$

38. If $x + \sqrt{x} = 90$, Find x.

(a) 81 (b) 64 (c) 80 (d) 72

RRB NTPC 12.04.2016 Shift : 1

Ans : (a) Given,

$$x + \sqrt{x} = 90$$

$$\Rightarrow \sqrt{x} = 90 - x$$

On squaring both side,

$$(\sqrt{x})^2 = (90 - x)^2$$

$$\Rightarrow x = 8100 + x^2 - 180x$$

$$\Rightarrow x^2 - 181x + 8100 = 0$$

$$\Rightarrow x^2 - 100x - 81x + 8100 = 0$$

$$\Rightarrow x(x - 100) - 81(x - 100) = 0$$

$$\Rightarrow (x - 81)(x - 100) = 0$$

$$\Rightarrow x = 81, 100$$

From, options the value of x will be 81.

39. Value of the square root of $\frac{36.1}{102.4}$ is:

- (a) $\frac{61}{340}$ (b) $\frac{19}{32}$ (c) $\frac{19}{34}$ (d) $\frac{19}{31}$

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

$$\text{Ans. (b) : } \sqrt{\frac{36.1}{102.4}} = \sqrt{\frac{361}{1024}}$$

$$\sqrt{\frac{(19)^2}{(32)^2}} = \frac{19}{32}$$

40. Find the square root

$$\frac{((0.091)(0.11))}{((0.91)(1.331))}$$

- (a) $\frac{1}{11}$ (b) $\frac{2}{11}$ (c) $\frac{4}{11}$ (d) $\frac{3}{11}$

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

$$\text{Ans. (a) : } x = \frac{0.091 \times 0.11}{0.91 \times 1.331} = \frac{91 \times 11}{91 \times 1331} = \frac{1}{121}$$

$$\sqrt{x} = \sqrt{\frac{1}{121}} = \frac{1}{11}$$

41. What is the value of $\sqrt{\frac{1.21 \times 0.9}{1.1 \times 0.11}}$?

- (a) 6 (b) 3 (c) 12 (d) 9

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,

$$\sqrt{\frac{1.21 \times 0.9}{1.1 \times 0.11}}$$

$$= \sqrt{\frac{121 \times 9}{11 \times 11}}$$

$$= \sqrt{9} = 3$$

42. Find the value of $\sqrt{\frac{576}{625}}$?

- (a) 0.96 (b) 0.9 (c) 0.99 (d) 10

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (a) :

$$\sqrt{\frac{576}{625}} = \frac{24}{25}$$

$$= 0.96$$

43. Find the value of $\sqrt{58\frac{7}{9}}$

- (a) $7\frac{2}{3}$ (b) $7\frac{7}{9}$ (c) $2\frac{2}{3}$ (d) $2\frac{7}{9}$

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

$$\text{Ans. (a) : } \sqrt{58\frac{7}{9}} = \sqrt{\frac{529}{9}} = \frac{23}{3} = 7\frac{2}{3}$$

44. The square root of $5\frac{44}{49}$ is:

- (a) $\frac{12}{7}$ (b) $\frac{17}{7}$ (c) $\frac{15}{7}$ (d) $\frac{16}{7}$

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

$$\text{Ans. (b) : Square root of } 5\frac{44}{49} = \sqrt{\frac{289}{49}} = \frac{17}{7}$$

45. Solve: $\frac{3\sqrt{121} - \sqrt{361}}{\sqrt{529} + 2\sqrt{36}}$

- (a) $\frac{3}{5}$ (b) $\frac{4}{7}$ (c) $\frac{1}{4}$ (d) $\frac{2}{5}$

RRB NTPC 28.03.2016 Shift : 3

Ans : (d) Given,

$$\frac{3\sqrt{121} - \sqrt{361}}{\sqrt{529} + 2\sqrt{36}} = \frac{3\sqrt{11 \times 11} - \sqrt{19 \times 19}}{\sqrt{23 \times 23} + 2\sqrt{6 \times 6}}$$

$$= \frac{33 - 19}{23 + 12}$$

$$= \frac{14}{35} = \frac{2}{5}$$

46. If $\sqrt{225} = 15$ then $(\sqrt{0.0000225})/15 =$

- (a) 0.0015 (b) 0.001
(c) 0.0001 (d) 0.015

RRB NTPC 12.04.2016 Shift : 1

Ans : (c) $\sqrt{225} = 15$

According to the question,

$$\frac{\sqrt{0.0000225}}{15}$$

$$= \frac{\sqrt{\frac{225}{100000000}}}{15}$$

$$= \frac{15}{10000 \times 15} = \frac{1}{10000} = 0.0001$$

47. If $\sqrt{256} = 16$ then the value of

$$\frac{\sqrt{0.0000256}}{16} \text{ will be:}$$

- (a) 0.0016 (b) 0.001
(c) 0.0001 (d) 0.016

RRB NTPC 29.04.2016 Shift : 3

Ans. (c) Given,

$$\sqrt{256} = 16$$

So,

$$\frac{\sqrt{0.0000256}}{16}$$

$$= \frac{\sqrt{\frac{256}{100000000}}}{16}$$

$$= \frac{16}{10000 \times 16}$$

$$= \frac{1}{10000} = 0.0001$$

48. If $\sqrt{9} = 3$ then the value of $\sqrt{81}/\sqrt{3}$

- (a) 3 (b) $3/\sqrt{3}$ (c) $3\sqrt{3}$ (d) 9

RRB NTPC 29.04.2016 Shift : 3

Ans. (c) Given, $\sqrt{9} = 3$

$$\text{So, } \frac{\sqrt{81}}{\sqrt{3}} = \frac{9}{\sqrt{3}} = \frac{3 \times \sqrt{3} \times \sqrt{3}}{\sqrt{3}} = 3\sqrt{3}$$

49. If $\sqrt{144} = 12$; then $(\sqrt{.00000144})/12$:

- (a) 0.0012 (b) 0.001
(c) 0.0001 (d) 0.012

RRB NTPC 30.04.2016 Shift : 1

Ans : (c) Given,

$$\sqrt{144} = 12$$

So,

$$\begin{aligned} \frac{\sqrt{0.00000144}}{12} &= \frac{\sqrt{\frac{144}{100000000}}}{12} \\ &= \frac{12}{10000 \times 12} = \frac{1}{10000} = 0.0001 \end{aligned}$$

50. $\sqrt[5]{\frac{32}{243}}$ value is equal.....?

- (a) $\frac{5}{3}$ (b) $\frac{3}{2}$ (c) $\frac{5}{2}$ (d) $\frac{2}{3}$

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (d) :

$$\begin{aligned} \sqrt[5]{\frac{32}{243}} &= \sqrt[5]{\left(\frac{2}{3}\right)^5} \\ &= \left(\frac{2}{3}\right)^{5 \times \frac{1}{5}} = \frac{2}{3} \end{aligned}$$

51. If $\sqrt{x} \div \sqrt{6.25} = 2$, then the value of x is:

- (a) 13 (b) 16 (c) 25 (d) 14

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (c) : From question,

$$\sqrt{x} \div \sqrt{6.25} = 2$$

$$\sqrt{x} \div 2.5 = 2$$

$$\sqrt{x} = 5$$

On squaring of both sides,

$$x = 25$$

Type-2

Problems Based on Indices

52. If $\sqrt{5^n} = 625$ then the value of n is :

- (a) 9 (b) 6
(c) 8 (d) 7

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (c) :

$$\text{If } \sqrt{5^n} = 625$$

$$\text{then } 5^{\frac{n}{2}} = (5)^4$$

On comparing both sides,

$$\frac{n}{2} = 4$$

Hence, n = 8

53. Solve the following

$$(1^3 + 2^3 + 3^3 + \dots + 8^3)^{-\frac{5}{2}}$$

- (a) $36^{-7.5}$ (b) $8^{-7.5}$
(c) 6^{-10} (d) 10^3

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$(1^3 + 2^3 + 3^3 + \dots + 8^3)^{-5/2}$$

$$\text{Sum of the cubes of n natural numbers} = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$= \left[\left\{ \frac{8(8+1)}{2} \right\}^2 \right]^{-5/2}$$

$$= [(4 \times 9)^2]^{-5/2}$$

$$= [(36)^2]^{-5/2}$$

$$= (36)^{-5}$$

$$= \frac{1}{36^5}$$

$$= \frac{1}{(6^2)^5} = 6^{-10}$$

54. If $\sqrt{3^n} = 729$, then the value of n is equal to:

- (a) 8 (b) 12
(c) 6 (d) 9

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (b) : $\sqrt{3^n} = 729$

$$\sqrt{3^n} = 3^6$$

$$3^n = 3^{12} \dots (\because \text{On squaring of both sides})$$

$$n = 12$$

55. If $\frac{9^m \times 3^5 \times 27^3}{3 \times 81^4} = 3^9$ then the value of m is:

- (a) 6 (b) 5
(c) 7 (d) 12

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : Given,

$$\frac{9^m \times 3^5 \times 27^3}{3 \times 81^4} = 3^9$$

$$9^m = \frac{3^9 \times 3 \times (3^4)^4}{3^5 \times (3^3)^3}$$

$$9^m = \frac{3^9 \times 3^1 \times 3^{16}}{3^5 \times 3^9}$$

$$9^m = 3^{26} \times 3^{-14}$$

$$3^{2m} = 3^{12}$$

$$2m = 12$$

$$\therefore m = 6$$

56. (8)^{2/3} = ?

- (a) $\sqrt{4}$
(c) 4

- (b) 2
(d) 64

RRB NTPC 11.04.2016 Shift : 1

Ans : (c) From the question,

$$8^{\frac{2}{3}} = \sqrt[3]{8^2} = \sqrt[3]{64} = \sqrt[3]{4 \times 4 \times 4} = 4$$

57. Simplify: $(25)^{\frac{3}{2}}$

- (a) 625
(c) 125

- (b) 15625
(d) $\sqrt{125}$

RRB NTPC 11.04.2016 Shift : 2

Ans : (c) From the given expression,

$$(25)^{\frac{3}{2}} = ((5)^2)^{\frac{3}{2}} = 5^3 = 125$$

58. Simplify : $(27)^{\frac{-2}{3}}$

- (a) 1/18
(c) 1/9

- (b) 9
(d) 18

RRB NTPC 26.04.2016 Shift : 2

$$\text{Ans : (c) } (27)^{\frac{-2}{3}} = \frac{1}{(3)^{\frac{2}{3} \times 3}} = \frac{1}{(3)^2} = \frac{1}{9}$$

59. $(1000)^{\frac{-1}{3}} = ?$

- (a) 10
(c) 1/10

- (b) 100
(d) 1/100

RRB NTPC 26.04.2016 Shift : 3

$$\text{Ans : (c) } (1000)^{\frac{-1}{3}} = \frac{1}{(1000)^{\frac{1}{3}}} = \frac{1}{(10^3)^{\frac{1}{3}}} = \frac{1}{10}$$

60. Solve the following

$$(625)^{0.17} \times (625)^{0.08} = ?$$

- (a) 5 (b) 25
(c) 1 (d) 2.5

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : From question,

$$(625)^{0.17} \times (625)^{0.08} = ?$$

$$= [(25)^2]^{0.17} \times [(25)^2]^{0.08}$$

$$= [(5^2)^2]^{0.17} \times [(5^2)^2]^{0.08}$$

$$= 5^{0.68} \times 5^{0.32}$$

$$= 5^{0.68 + 0.32}$$

$$? = 5$$

61. If $a^{2x} = b$, $b^{2y} = c$, $c^{2z} = a$ then the value of xyz is:

- (a) 1 (b) $\frac{1}{8}$
(c) 8 (d) 0

RRB NTPC 15.03.2021 (Shift-II) Stage I

Ans. (b) : Given,

$$a^{2x} = b, b^{2y} = c, c^{2z} = a \text{ then } xyz = ?$$

Where,

$$a = c^{2z}$$

$$a = (b^{2y})^{2z}$$

$$a = (b)^{4yz}$$

$$a = (a^{2x})^{4yz}$$

$$a = (a)^{8xyz}$$

$$a^1 = a^{8xyz}$$

$$8xyz = 1$$

$$xyz = \frac{1}{8}$$

62. If $2^x = 4^{y+1}$ and $3^y = 3^{x-9}$, then the respective values of x and y will be

- (a) (7, 16) (b) (-16, 7)
(c) (16, 7) (d) (16, 7)

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$2^x = 4^{y+1} \text{ and } 3^y = 3^{x-9}$$

$$2^x = 2^{2(y+1)}$$

On comparing exponent

$$x = 2y + 2 \quad \text{--- (I)}$$

$$\text{And } 3^y = 3^{x-9}$$

$$y = x - 9 \quad \text{--- (II)}$$

On putting the value of 'y' in eqⁿ (i)

$$x = 2x - 18 + 2$$

$$x = 16$$

On putting the value of 'x' in eqⁿ (ii)

$$y = 16 - 9$$

$$y = 7$$

Hence, value of x and y will be 16 and 7 respectively.

63. Simplify : $(2.25)^{\frac{1}{2}}$

- (a) 1.5 (b) 15
(c) 1.6 (d) 2/3

RRB NTPC 17.01.2017 Shift-3

Ans : (a) From the given expression,

$$(2.25)^{\frac{1}{2}}$$

$$= \sqrt{2.25}$$

$$= \sqrt{\frac{225}{100}}$$

$$= \sqrt{\frac{15 \times 15}{10 \times 10}}$$

$$= \frac{15}{10} = 1.5$$

64. What are the values of x in the following equation?

$$3^{2x+1} - 3^x = 3^{x+3} - 3^2$$

- (a) 4, -2 (b) 4, -1
(c) 2, -1 (d) 3, -1

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (c) : From question,

$$3^{2x+1} - 3^x = 3^{x+3} - 3^2$$

$$3^{2x} \cdot 3 - 3^x = 3^x \cdot 3^3 - 3^2 \quad \{a^x \cdot a^y = a^{x+y}\}$$

$$3^{2x} \cdot 3 - 3^x - 3^x \cdot 3^3 + 3^2 = 0$$

$$3^x (3 \cdot 3^x - 1) - 3^2 (3 \cdot 3^x - 1) = 0$$

$$(3^x - 3^2) (3 \cdot 3^x - 1) = 0$$

$$\therefore (3^x - 3^2) = 0$$

$$3^x = 3^2$$

$$x = 2$$

$$\therefore 3^{x+1} - 1 = 0$$

$$3^{x+1} = 3^0$$

$$\{x^0 = 1\}$$

$$x + 1 = 0$$

$$x = -1$$

Type - 3 Miscellaneous

65. Which of the following numbers is not a perfect square?

- (a) 41,616 (b) 16,384
(c) 23,102 (d) 97,344

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (c) : The unit digit of any perfect square number can be 0, 1, 4, 5, 6 and 9, while 2, 3, 7 and 8 cannot.

The unit digit of the number given in option (c) is 2.

So it is not a perfect square.

66. The expression $(21.98 \times 21.98 + 21.98 X + 0.04 \times 0.04)$ will be a perfect square if $X = ?$

- (a) 0.08 (b) 0.20
(c) 0.02 (d) 0.40

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (a) : $21.98 \times 21.98 + 21.98 X + 0.04 \times 0.04$

$$\Rightarrow (21.98)^2 + (.04)^2 + 2 \times 0.04 \times 21.98$$

$$(a + b)^2 = a^2 + b^2 + 2a \times b$$

then $2 \times 0.04 = X$

$$X = 0.08$$

67. If $\sqrt{0.003 \times 0.3 \times p} = 0.3 \times 0.03 \times \sqrt{q}$, then find the value of p/q is:

- (a) 0.9 (b) 0.0009
(c) 0.09 (d) 0.009

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : $\sqrt{0.003 \times 0.3 \times p} = 0.3 \times 0.03 \times \sqrt{q}$

$$\sqrt{\frac{p}{q}} = \frac{0.3 \times 0.03}{\sqrt{0.003 \times 0.3}}$$

On squaring of both sides,

$$\frac{p}{q} = \frac{0.09 \times 0.0009}{0.003 \times 0.3}$$

$$\frac{p}{q} = \frac{0.000081}{0.0009}$$

$$\frac{p}{q} = 0.09$$

68. In the following expression which number should be added so that it becomes a complete square?

$$1 + 3 + 7 + 9 + 11 + 13$$

- (a) 1 (b) 3
(c) 7 (d) 5

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (d) : $1 + 3 + 7 + 9 + 11 + 13$

$$= 44$$

$$\text{Number} = 44 + 5 = 49 = (7)^2$$

Hence, 5 should be added in 44 so that it becomes a complete square.

69. If $\sqrt{7} = 2.6$, then the value of $\frac{5\sqrt{7}}{4\sqrt{7} - 0.4}$ is:

- (a) 1.3 (b) 1.2
(c) 1.5 (d) 1.1

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (a) : $\frac{5\sqrt{7}}{4\sqrt{7} - 0.4} \quad (\because \sqrt{7} = 2.6)$

$$= \frac{5 \times 2.6}{4 \times 2.6 - 0.4} = \frac{13.0}{10.4 - 0.4} = \frac{13}{10} = 1.3$$

70. A positive number exceed its square root by 30. Find the number.

- (a) 16 (b) 36
(c) 25 (d) 49

RRB NTPC 02.04.2016 Shift : 3

Ans : (b) Let the number be x , then-

$$x = \sqrt{x} + 30$$

$$x - 30 = \sqrt{x}$$

On squaring in both side-

$$(x - 30)^2 = (\sqrt{x})^2$$

$$x^2 + 900 - 60x = x$$

$$x^2 - 60x - x + 900 = 0$$

$$x^2 - 61x + 900 = 0$$

$$x^2 - 36x - 25x + 900 = 0$$

$$x(x - 36) - 25(x - 36) = 0$$

$$(x - 36)(x - 25) = 0$$

$$x - 36 = 0 \text{ or } x - 25 = 0$$

$$x = 36 \text{ or } x = 25$$

25 is not more than its square root, which does not follow the condition.

Hence, the required number will be $x = 36$.

71. What smallest number should be added to the sum of squares of 15 and 14, so that the resulting number is a perfect square?

- (a) 17 (b) 20 (c) 11 (d) 9

RRB NTPC 29.03.2016 Shift : 1

Ans : (b) According to the question,

$$15^2 + 14^2 = 225 + 196 = 421$$

$$\text{Square number nearest to } 421 = 441 = (21)^2$$

Let the number to added be x ,

$$421 + x = 441$$

$$\Rightarrow x = 441 - 421 = 20$$

Hence, the required number = 20

Simplification

Type - 1

Simple Problems Related to Addition, Subtraction, Multiplication and Division

1. $243 \div 3 \div 3 \div 3 \div 3$ is equal to :

- (a) 27 (b) 3
(c) 243 (d) 9

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$\begin{aligned} 243 \div 3 \div 3 \div 3 \div 3 \\ = 81 \div 3 \div 3 \div 3 \\ = 27 \div 3 \div 3 \\ = 9 \div 3 \\ = 3 \end{aligned}$$

2. What is the value of the following expression?

$$(-20)^3 + (13)^3 + (7^3)$$

- (a) 4566 (b) -4650
(c) -5460 (d) 4560

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$\begin{aligned} (-20)^3 + (13)^3 + (7^3) \\ = -8000 + 2197 + 343 \\ = -8000 + 2540 \\ = -5460 \end{aligned}$$

3. Find the solution of :- $4/11 + 2/7 + 3/5$

- (a) $37/35$ (b) $481/385$
(c) $13/35$ (d) $37/385$

RRB NTPC 18.01.2017 Shift : 3

$$\begin{aligned} \text{Ans : (b)} \quad \frac{4}{11} + \frac{2}{7} + \frac{3}{5} \\ = \frac{35 \times 4 + 2 \times 55 + 3 \times 77}{385} \\ = \frac{140 + 110 + 231}{385} \\ = \frac{481}{385} \end{aligned}$$

4. $97 \times 97 = ?$

- (a) 9391 (b) 9409
(c) 9049 (d) 9309

RRB NTPC 31.03.2016 Shift : 2

Ans : (b) From the given expression,

$$\begin{aligned} 97 \times 97 &= (97)^2 \\ (100-3)^2 &= (100)^2 + (3)^2 - 2 \times 100 \times 3 \\ &= 10000 + 9 - 600 \\ &= 9409 \end{aligned}$$

5. Simplify: $\frac{9}{13} \div \frac{18}{26} \div \frac{90}{52}$

- (a) $45/26$ (b) $13/45$
(c) $26/45$ (d) $45/13$

RRB NTPC 03.04.2016 Shift : 1

Ans : (c) From the given expression,

$$\begin{aligned} \frac{9}{13} \div \frac{18}{26} \div \frac{90}{52} \\ = \frac{9}{13} \times \frac{26}{18} \times \frac{52}{90} \\ = \frac{26}{45} \end{aligned}$$

6. Calculate : $19170 \div 54 \div 5$

- (a) 17 (b) 1775
(c) 71 (d) 1757

RRB NTPC 11.04.2016 Shift : 3

Ans : (c) From the given expression,

$$\begin{aligned} 19170 \div 54 \div 5 \\ = 355 \div 5 \\ = 71 \end{aligned}$$

7. Calculate:

$$66666 \times 9999$$

- (a) 665693334 (b) 666594334
(c) 666953334 (d) 666593334

RRB NTPC 07.04.2016 Shift : 1

Ans : (d) 66666×9999

$$\begin{aligned} &= 66666 (10000 - 1) \\ &= 666660000 - 66666 = 666593334 \end{aligned}$$

8. Simplify : $7\frac{1}{3} + 3\frac{1}{7}$

- (a) $1\frac{3}{11}$ (b) $1\frac{4}{11}$
(c) $2\frac{3}{7}$ (d) $2\frac{4}{7}$

RRB NTPC 29.03.2016 Shift : 2

$$\begin{aligned} \text{Ans : (b)} \quad 7\frac{1}{3} + 3\frac{1}{7} &= \frac{3}{22} + \frac{3}{22} \\ &= \frac{9}{22} + \frac{21}{22} \\ &= \frac{30}{22} \\ &= \frac{15}{11} = 1\frac{4}{11} \end{aligned}$$

9. Find the value of 1093×1093

- (a) 1194649 (b) 1162481
(c) 1424649 (d) 1428481

RRB NTPC 22.04.2016 Shift : 1

Ans : (a) Given expression

$$\begin{aligned} & 1093 \times 1093 \\ &= (1000 + 93) \times 1093 \\ &= 1093000 + 1093 \times 93 \\ &= 1093000 + 1093 \times (100 - 7) \\ &= 1093000 + 109300 - 1093 \times 7 \\ &= 1093000 + 109300 - 1093(10 - 3) \\ &= 1093000 + 109300 - 10930 + 3279 \\ &= 1205579 - 10930 = 1194649 \end{aligned}$$

10. $(64 \times 5^4) - (5^4 \times 16) = ?$

- (a) 40,000 (b) 35,000
(c) 30,000 (d) 25,000

RRB NTPC 26.04.2016 Shift : 1

Ans : (c) $(64 \times 5^4) - (5^4 \times 16)$
 $= (64 \times 625) - (625 \times 16)$
 $\Rightarrow 40,000 - 10,000 = 30,000$

11. Solve the following.

$$8 \div 8 \times \frac{8+8}{8 \div 8 \times 8+8} = ?$$

- (a) 128 (b) 1
(c) 64 (d) $\frac{1}{128}$

RRB NTPC 17.02.2021 (Shift-I) Stage Ist

Ans. (b) : $8 \div 8 \times \frac{8+8}{8 \div 8 \times 8+8} = ?$
 $1 \times \frac{16}{16} = 1 \times 1 = 1$

12. $(1 + 2/3) \div [(1+1/3) \div (2/3 + 1)] = ?$

- (a) $\frac{4}{3}$ (b) $\frac{3}{4}$
(c) $\frac{12}{25}$ (d) $\frac{25}{12}$

RRB NTPC 17.01.2017 Shift-2

Ans : (d) From the given expression,

$$\begin{aligned} & \left(1 + \frac{2}{3}\right) \div \left[\left(1 + \frac{1}{3}\right) \div \left(\frac{2}{3} + 1\right)\right] \\ &= \frac{5}{3} \div \left[\frac{4}{3} \times \frac{3}{5}\right] \\ &= \frac{5}{3} \times \frac{5}{4} \\ &= \frac{25}{12} \end{aligned}$$

13. Simplify: $(3/2 + 5/3) \div (3/2 + 2/3)$

- (a) 1 (b) 19/13
(c) 13/19 (d) 13/16

RRB NTPC 04.04.2016 Shift : 3

Ans : (b) From the given expression,

$$\begin{aligned} & \left(\frac{3}{2} + \frac{5}{3}\right) \div \left(\frac{3}{2} + \frac{2}{3}\right) = \left(\frac{9+10}{6}\right) \div \left(\frac{9+4}{6}\right) \\ &= \frac{19}{6} \div \frac{13}{6} \\ &= \frac{19}{6} \times \frac{6}{13} = \frac{19}{13} \end{aligned}$$

14. $5(10)^4 + 6(10)^3 + 4(10) - 3(1/100) = ?$

- (a) 54,60.33 (b) 54,309.97
(c) 56,407.00 (d) 56,039.97

RRB NTPC 31.03.2016 Shift : 3

Ans : (d) From the given expression,

$$\begin{aligned} & 5(10)^4 + 6 \times (10)^3 + 4(10) - 3(1/100) \\ &= 5 \times 10000 + 6 \times 1000 + 4 \times 10 - 3 \times \frac{1}{100} \\ &= 50000 + 6000 + 40 - 0.03 \\ &= 56040 - 0.03 = 56039.97 \end{aligned}$$

Type - 2 Problems Based on The Rule of BODMAS

15. Simplify the following expression :

$$(15 \div 3) - \{[(19 - 1) \div 2] - \{5 \times 20 - (7 \times 9 - (-2))\}\}$$

- (a) 21 (b) 31
(c) -21 (d) 35

RRB NTPC (Stage-2) 16/06/2022 (Shift-I)

Ans. (b) :

$$\begin{aligned} & (15 \div 3) - \{[(19 - 1) \div 2] - \{5 \times 20 - (7 \times 9 - (-2))\}\} \\ &= 5 - \{[(19 - 1) \div 2] - \{5 \times 20 - (7 \times 9 - (-2))\}\} \\ &= 5 - \{[18 \div 2] - \{100 - (63 + 2)\}\} \\ &= 5 - [9 - \{100 - 65\}] \\ &= 5 - [9 - 35] \\ &= 5 + 26 \\ &= 31 \end{aligned}$$

16. Find the value of $84 \div 32 \times 8 - 15 \div 8 \times (19 - 35)$

- (a) 38 (b) 45
(c) 51 (d) 42

RRB NTPC (Stage-2) 14/06/2022 (Shift-I)

Ans. (c) : $84 \div 32 \times 8 - 15 \div 8 \times (19 - 35)$

$$\begin{aligned} &= 84 \div 32 \times 8 - 15 \div 8 \times (-16) \\ &= \frac{84}{32} \times 8 - \frac{15}{8} \times (-16) \\ &= 21 + 30 = 51 \end{aligned}$$

17. Find the value of $72 \div 4 \times \{8 \times 4 - (14 - 19)\}$

- (a) 666 (b) 444
(c) 222 (d) 1296

RRB NTPC (Stage-2) 14/06/2022 (Shift-I)

Ans. (a) : $72 \div 4 \times \{8 \times 4 - (14 - 19)\}$

$$\begin{aligned} &= 72 \div 4 \{8 \times 4 - (-5)\} \\ &= 72 \div 4 \{8 \times 4 + 5\} \\ &= 72 \div 4 \{32 + 5\} \\ &= 72 \div 4 \times 37 \\ &= 18 \times 37 \\ &= 666 \end{aligned}$$

18. The value of $3 + [3 \times \{3 - (3 + 3) \div 6\}]$ is:

- (a) 3 (b) 9
(c) 6 (d) -3

RRB NTPC 13.03.2021 (Shift-I) Stage I

Ans. (b) : The value of $3 + [3 \times \{3 - (3 + 3) \div 6\}]$

$$\begin{aligned} &= 3 + [3 \times \{3 - 6 \div 6\}] \\ &= 3 + [3 \times \{3 - 1\}] \\ &= 3 + [3 \times 2] \\ &= 3 + 6 \\ &= 9 \end{aligned}$$

19. Using BODMAS, simplify the following.

$$\frac{7}{9} \times \frac{21}{5} \times 25(65^2 - 55^2)$$

- (a) 42000 (b) 86000
(c) 98000 (d) 84000

RRB NTPC 28.01.2021 (Shift-I) Stage I

Ans. (c) : Given expression,

$$\begin{aligned} & \frac{7}{9} \times \frac{21}{5} \times 25(65^2 - 55^2) \\ &= \frac{49 \times 5}{3} [(65 + 55)(65 - 55)] \\ &= \frac{49 \times 5}{3} \times 120 \times 10 \\ &= 49 \times 5 \times 40 \times 10 \\ &= 98000 \end{aligned}$$

20. What is the value of $\frac{2}{7} \times [2 + \{2(11 + 4 - 2)\}] - 2$

- (a) 7 (b) 9 (c) 8 (d) 6

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : From question,

$$\frac{2}{7} \times [2 + \{2(11 + 4 - 2)\}] - 2$$

From BODMAS

$$\begin{aligned} &= \frac{2}{7} \times [2 + \{2 \times 13\}] - 2 \\ &= \frac{2}{7} \times [2 + 26] - 2 \\ &= \frac{2}{7} \times 28 - 2 \\ &= 2 \times 4 - 2 \\ &= 6 \end{aligned}$$

21. The value of $15 \times 14 - 30 + (3^2 + 17)$ is:

- (a) 154 (b) 266
(c) 124 (d) 206

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given expression,

$$\begin{aligned} & 15 \times 14 - 30 + (3^2 + 17) = ? \\ &= 210 - 30 + 26 \\ &= 210 - 4 = 206 \end{aligned}$$

22. Solve it

$$79 + [37 - \{45 - (1 - 36 \div 6 \times 8)\}] = ?$$

- (a) 33 (b) 24
(c) 59 (d) 41

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

$$79 + [37 - \{45 - (1 - 36 \div 6 \times 8)\}]$$

Solving by BODMAS rule-

$$\begin{aligned} &= 79 + [37 - \{45 - (1 - 6 \times 8)\}] \\ &= 79 + [37 - \{45 - (1 - 48)\}] \\ &= 79 + [37 - \{45 + 47\}] \\ &= 79 + [37 - 92] \\ &= 116 - 92 \\ &= 24 \end{aligned}$$

23. Solve the following

$$(4 + 2 - 16 \div 4 + 3) + \{(1 + 8 \times 7) \div 19\} \times [(3 + 5 - 4) + (17 - 9 \times 4)] = ?$$

- (a) -40 (b) 40
(c) -225 (d) 335

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

$$\begin{aligned} \text{Ans. (a) : } & (4 + 2 - 16 \div 4 + 3) + \{(1 + 8 \times 7) \div 19\} \times [(3 + 5 - 4) + (17 - 9 \times 4)] \\ &= (6 - 4 + 3) + \{57 \div 19\} \times [4 + (-19)] \\ &= 5 + 3 \times (-15) \\ &= 5 - 45 \\ &= -40 \end{aligned}$$

24. Solve the given equation

$$2 - [2 - \{2 - 2(2 + 2)\}] = ?$$

- (a) -4 (b) 6
(c) 4 (d) -6

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

$$\text{Ans. (d) : } 2 - [2 - \{2 - 2(2 + 2)\}] = ?$$

$$2 - [2 - \{2 - 8\}] = ?$$

$$2 - [8] = ?$$

$$? = -6$$

25. The value of $\left\{ \frac{3}{5} \times [3 + \{3 + (11 + 5 + 6)\}] \right\}$ is:

- (a) $10\frac{2}{5}$ (b) $12\frac{6}{5}$ (c) $11\frac{4}{5}$ (d) $16\frac{4}{5}$

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (d) : From question,

$$\begin{aligned} & \left\{ \frac{3}{5} \times [3 + \{3 + (11 + 5 + 6)\}] \right\} \\ &= \left\{ \frac{3}{5} \times [3 + \{3 + (22)\}] \right\} \\ &= \left\{ \frac{3}{5} \times [3 + \{25\}] \right\} \\ &= \left\{ \frac{3}{5} \times [28] \right\} \\ &= \left\{ \frac{3}{5} \times 28 \right\} \\ &= 16\frac{4}{5} \end{aligned}$$

26. Simplify

$$24 \times 3 - 5 \times \frac{1}{3} \{[-5(5 - 2)] \div 10\}$$

- (a) 121.5 (b) 69.5
(c) 74.5 (d) 31.5

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

$$\text{Ans. (c) : } 24 \times 3 - 5 \times \frac{1}{3} \{[-5(5 - 2)] \div 10\}$$

Solving by BODMAS rule-

$$\begin{aligned} &= 24 \times 3 - 5 \times \frac{1}{3} \{[-5 \times 3] \div 10\} \\ &= 24 \times 3 - 5 \times \frac{1}{3} \{-15 \div 10\} = 24 \times 3 - 5 \times \frac{1}{3} \times \frac{-3}{2} \\ &= 72 + \frac{5}{2} = \frac{144 + 5}{2} \\ &= \frac{149}{2} = 74.5 \end{aligned}$$

27. Find the value of $7 + 5 - 2 \times (7 + 89) - 94 \div 2 + (33 \div 3 + 9 \times 2 - 7) \div 11$.
 (a) -235 (b) -245 (c) 245 (d) -225

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (d) : $7 + 5 - 2 \times (7 + 89) - 94 \div 2 + (33 \div 3 + 9 \times 2 - 7) \div 11$
 $= 12 - 2 \times 96 - 47 + (11 + 18 - 7) \div 11$
 $= 12 - 192 - 47 + 2$
 $= 14 - 239 = -225$

28. Simplify :
 $1800 \div 10 \times \{45 \div (17-2)\} \times 2 + \{-2(1+2)\}$
 (a) 0 (b) 180
 (c) 114 (d) 1074

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given-
 $1800 \div 10 \times \{45 \div (17-2)\} \times 2 + \{-2(1+2)\}$
 $= 1800 \div 10 \times \{45 \div 15\} \times 2 + \{-2 \times 3\}$
 $= 1800 \div 10 \times \{3\} \times 2 + \{-6\}$
 $= 1800 \div 10 \times 6 - 6$
 $= 180 \times 6 - 6$
 $= 1080 - 6$
 $= 1074$

29. Simplify:
 $1 \div \{p^2 / (p+6)\} + \{6p / (p+6)\}$
 (a) $\frac{1}{p}$ (b) $\frac{1}{(p+6)}$
 (c) $p+6$ (d) p

RRB NTPC 17.01.2017 Shift-2

Ans : (a) From the given expression,
 $1 \div \left[\frac{p^2}{(p+6)} + \frac{6p}{(p+6)} \right]$
 $= 1 \div \left[\frac{p^2 + 6p}{p+6} \right]$
 $= 1 \div \left[\frac{p(p+6)}{(p+6)} \right]$
 $= 1 \div p = \frac{1}{p}$

30. The value of $\frac{32 \div 4 - 5 \times 8 \div 3}{5 \times 3 - \{6+3\}}$ is:
 (a) $\frac{4}{9}$ (b) $-\frac{8}{9}$ (c) $\frac{8}{9}$ (d) $\frac{1}{9}$

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) :
 $\frac{32 \div 4 - 5 \times 8 \div 3}{5 \times 3 - \{6+3\}}$
 $= \frac{8 - 5 \times 8 \div 3}{15 - 9}$
 $= \frac{8 - \frac{40}{3}}{6} = \frac{-\frac{16}{3}}{6}$
 $= -\frac{16}{18} = -\frac{8}{9}$

31. The value of $\frac{\{(13)^3 - 4^3\}}{13-8 \div 2} \div 8 - \{2+6 \times 9\}$ is:

- (a) $-\frac{217}{8}$ (b) $-\frac{211}{8}$
 (c) $-\frac{685}{8}$ (d) $\frac{685}{8}$

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,

$$\begin{aligned} & \frac{\{(13)^3 - 4^3\}}{13-8 \div 2} \div 8 - \{2+6 \times 9\} \\ &= \frac{(2197-64)}{13-4} \times \frac{1}{8} - (2+54) \\ &= \frac{2133}{9} \times \frac{1}{8} - 56 \\ &= \frac{711}{3} \times \frac{1}{8} - 56 \\ &= \frac{711}{24} - \frac{56}{1} \\ &= \frac{711-1344}{24} = -\frac{633}{24} \\ &= -\frac{211}{8} \end{aligned}$$

Type - 3 Problems Based on Finding The Value of a Term of an Expression

32. If $1\frac{1}{4} \times \left(5\frac{3}{4} \div \frac{2}{7} \text{ of } k\right) \div 2\frac{7}{8} - 3\frac{3}{4} = (17-4) \div 2 \text{ of } 2$
 is then find the value of $\frac{k+1}{k-1}$

- (a) $\frac{5}{2}$ (b) 9 (c) 7 (d) $\frac{11}{3}$

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

Ans. (b) :

$$\begin{aligned} \Rightarrow 1\frac{1}{4} \left(5\frac{3}{4} \div \frac{2}{7} \text{ of } k\right) \div 2\frac{7}{8} - 3\frac{3}{4} &= (17-4) \div 2 \text{ of } 2 \\ \Rightarrow \frac{5}{4} \times \left(\frac{23}{4} \div \frac{2k}{7}\right) \div \frac{23}{8} - \frac{15}{4} &= 13 \div 4 \\ \Rightarrow \frac{5}{4} \times \frac{161}{8k} \times \frac{8}{23} - \frac{15}{4} &= \frac{13}{4} \\ \Rightarrow \frac{35}{4k} &= \frac{28}{4} \\ \Rightarrow \frac{35}{4k} &= 7 \\ \Rightarrow k &= \frac{35}{4 \times 7} = \frac{5}{4} \\ \frac{k+1}{k-1} &= \frac{\frac{5}{4}+1}{\frac{5}{4}-1} = \frac{9}{1} = 9 \end{aligned}$$

33. If $(1 + 2 + x) - (0.12 - 0.42 + 0.94) = 4$ then what will be the value of x ?
- (a) 2.54 (b) 1.64
(c) 1.54 (d) 2.64

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,
 $(1 + 2 + x) - (0.12 - 0.42 + 0.94) = 4$
 $(3 + x) - (0.64) = 4$
 $3 + x = 4.64$
 $x = 4.64 - 3 = 1.64$

34. If x is the closest approximate to the product $0.3333 \times 0.25 \times 0.499 \times 0.125 \times 24$, then find the value of x

- (a) $\frac{3}{4}$ (b) $\frac{2}{5}$ (c) $\frac{3}{8}$ (d) $\frac{1}{8}$

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given-
 $x = 0.3333 \times 0.25 \times 0.499 \times 0.125 \times 24$
 $x = 0.3 \times 0.25 \times 0.5 \times 0.125 \times 24$
 $x = \frac{3}{10} \times \frac{25}{100} \times \frac{5}{10} \times \frac{125}{1000} \times 24$
 $x = \frac{3}{10} \times \frac{1}{4} \times \frac{1}{2} \times \frac{1}{8} \times 24$
 $x = \frac{9}{80} = \frac{1}{8} \times \frac{9}{10}$
 $= \frac{1}{8} \times 0.9 = \frac{1}{8} \times 1$ (Approx)
 $x = \frac{1}{8}$

35. If $2x - 3y = -1$ and $\frac{x}{x+y} = \frac{7}{12}$, then the value of $2xy$ is:

- (a) 65 (b) 70
(c) 60 (d) 75

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : $2x - 3y = -1$ (i)
and $\frac{x}{x+y} = \frac{7}{12}$
 $\Rightarrow 12x = 7x + 7y$
 $\Rightarrow 5x = 7y$
 $\Rightarrow \frac{x}{y} = \frac{7}{5}$
 $x = 7, y = 5$ which satisfy equation (i)
Hence $2xy = 2 \times 7 \times 5 = 70$

36. If $\frac{x}{2y} = \frac{6}{7}$, then what is the value of

$$\frac{x-y}{x+y} + \frac{14}{19} = ?$$

- (a) $\frac{110}{99}$ (b) $\frac{19}{19}$
(c) $\frac{109}{19}$ (d) $\frac{99}{109}$

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) : $\frac{x}{2y} = \frac{6}{7}$

$$\frac{x}{y} = \frac{12}{7}$$

Let $x = 12k, y = 7k$

$$\begin{aligned} \frac{x-y}{x+y} + \frac{14}{19} &= \frac{12k-7k}{12k+7k} + \frac{14}{19} \\ &= \frac{5k}{19k} + \frac{14}{19} \\ &= \frac{5+14}{19} = \frac{19}{19} \end{aligned}$$

37. If $(a + b\sqrt{2})^2 = 19 + 6\sqrt{2}$, then a is equal to:

- (a) 4 (b) 3
(c) 2 (d) 1

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) : $(a + b\sqrt{2})^2 = 19 + 6\sqrt{2}$
 $= 19 + 2 \times 3\sqrt{2}$
 $= 19 + 2 \times 1 \times 3\sqrt{2}$
 $= 1^2 + (3\sqrt{2})^2 + 2 \times 1 \times 3\sqrt{2}$
From Formula, $(a+b)^2 = a^2 + b^2 + 2ab$
 $(a + b\sqrt{2})^2 = (1 + 3\sqrt{2})^2$
 $a + b\sqrt{2} = 1 + 3\sqrt{2}$
On comparing the both side,
 $a = 1$ and $b = 3$

38. Select the number that can replace the question mark (?) in the following equation.

$$? + \frac{18}{24} + 3\frac{3}{4} = 23\frac{13}{24}$$

- (a) $19\frac{1}{24}$ (b) $19\frac{13}{24}$
(c) 1 (d) $19\frac{11}{24}$

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (a) : From question,
 $? + \frac{18}{24} + 3\frac{3}{4} = 23\frac{13}{24}$
 $? + \frac{18}{24} + \frac{15}{4} = \frac{565}{24}$
 $? = \frac{565}{24} - \frac{18}{24} - \frac{15}{4}$
 $= \frac{565 - 18 - 90}{24} = \frac{457}{24} = 19\frac{1}{24}$

39. Find the value of x

$$1\frac{1}{5} - 3\frac{2}{4} \div 1\frac{3}{4} \div \left(x + 3\frac{1}{8}\right) \div 1\frac{1}{7} = 1$$

- (a) $x = 3\frac{5}{8}$ (b) $x = 3\frac{3}{8}$
(c) $x = 5\frac{5}{8}$ (d) $x = 7\frac{5}{8}$

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (c) : $1\frac{1}{5} - 3\frac{2}{4} \div 1\frac{3}{4} \div \left(x + 3\frac{1}{8}\right) \div 1\frac{1}{7} = 1$

$$\frac{6}{5} - \frac{14}{4} \times \frac{4}{7} \times \frac{8}{(8x+25)} \times \frac{7}{8} = 1$$

$$\frac{6}{5} - \frac{14}{(8x+25)} = 1$$

$$\frac{1}{5} = \frac{14}{(8x+25)}$$

$$8x + 25 = 70$$

$$8x = 45$$

$$x = 5\frac{5}{8}$$

40. If $\sqrt{625} \div \sqrt{x} = \frac{1}{5}$, then x = ?

- (a) 15625 (b) 3125
(c) 125 (d) 1225

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (a) : $\sqrt{625} \div \sqrt{x} = \frac{1}{5}$

$$\frac{25}{\sqrt{x}} = \frac{1}{5} \Rightarrow \sqrt{x} = 125$$

$$x = 15625$$

41. If $\frac{x}{y} = \frac{4}{5}$ then find the value of

$$\frac{5x+7y}{5x-7y} + \frac{6x+4y}{7x-8y}$$

- (a) $-\frac{4}{5}$ (b) $\frac{11}{3}$
(c) $\frac{3}{2}$ (d) $-\frac{22}{3}$

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : Given,

$$\frac{x}{y} = \frac{4}{5}$$

Let $x = 4, y = 5$

$$\frac{5x+7y}{5x-7y} + \frac{6x+4y}{7x-8y} = \frac{20+35}{20-35} + \frac{24+20}{28-40}$$

$$= \frac{55}{-15} + \frac{44}{-12}$$

$$= -\frac{11}{3} - \frac{11}{3}$$

$$= -\frac{22}{3}$$

42. If $\frac{x-y}{3} = \frac{x+y}{5} = \frac{xy}{8}$, then find the value of xy.

- (a) 18 (b) 14
(c) 16 (d) 12

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let, $\frac{x-y}{3} = \frac{x+y}{5} = \frac{xy}{8} = k$

$$x-y = 3k \dots (i)$$

$$x+y = 5k \dots (ii)$$

From equ. (i) + (ii),

$$x = 4k \text{ and } y = k$$

$$\frac{xy}{8} = k$$

$$xy = 8k$$

$$x \quad y = 8k$$

$$\downarrow \quad \downarrow$$

$$4k \times k = 8k$$

$$k = 2$$

$$xy = 8k \Rightarrow xy = 8 \times 2 = 16$$

43. If $\frac{x}{y} = \frac{6}{5}$, then the value of $\frac{x^2+y^2}{x^2-y^2}$ is:

- (a) $\frac{60}{34}$ (b) $\frac{61}{11}$
(c) $\frac{11}{61}$ (d) $\frac{60}{11}$

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (b) : $\frac{x}{y} = \frac{6}{5}$

$$x = 6k$$

$$\text{and } y = 5k$$

$$\frac{x^2+y^2}{x^2-y^2} = \frac{(6k)^2+(5k)^2}{(6k)^2-(5k)^2} = \frac{61k^2}{11k^2}$$

$$= \frac{61}{11}$$

44. If $19\frac{2}{3} - 7\frac{1}{4} = x + 2\frac{1}{2}$, then what will be the value of x?

- (a) $9\frac{11}{12}$ (b) $\frac{11}{12}$
(c) $11\frac{9}{12}$ (d) $9\frac{1}{12}$

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (a) : $19\frac{2}{3} - 7\frac{1}{4} = x + 2\frac{1}{2}$

$$\frac{59}{3} - \frac{29}{4} = x + \frac{5}{2}$$

$$x = \frac{59}{3} - \frac{29}{4} - \frac{5}{2}$$

$$x = \frac{236-87-30}{12}$$

$$x = \frac{119}{12} \text{ or } 9\frac{11}{12}$$

45. If $\frac{154}{0.154} = \frac{15.4}{x}$, then find the value of x
 (a) 0.0154 (b) 15.4
 (c) 154 (d) 1.54

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (a) :

$$\frac{154}{0.154} = \frac{15.4}{x}$$

$$\frac{1000}{1} = \frac{15.4}{x}$$

$$\therefore x = \frac{15.4}{1000} = 0.0154$$

46. If $\frac{3x}{2y} = \frac{48}{72}$ then $\frac{x}{y}$ in its lowest term is:
 (a) $\frac{2}{9}$ (b) $\frac{4}{9}$
 (c) $\frac{5}{9}$ (d) $\frac{3}{9}$

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,

$$\frac{3x}{2y} = \frac{48}{72}$$

$$\frac{x}{y} = \frac{48 \times 2}{72 \times 3}$$

$$\frac{x}{y} = \frac{2}{3} \times \frac{2}{3}$$

$$\frac{x}{y} = \frac{4}{9}$$

47. The value of x in the equation $x + \frac{5}{27} = \frac{12}{27}$ is
 (a) $\frac{7}{27}$ (b) $\frac{10}{27}$
 (c) $\frac{1}{3}$ (d) $\frac{9}{27}$

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (a) : $x + \frac{5}{27} = \frac{12}{27}$

$$x = \frac{12}{27} - \frac{5}{27} = \frac{7}{27}$$

Hence $x = \frac{7}{27}$

48. $9876 + 34.567 - ? = 9908.221$
 (a) 23.45 (b) 234.6
 (c) 2.345 (d) 2.346

RRB NTPC 06.04.2016 Shift : 2

Ans : (d) According to the question,

$$9876 + 34.567 - ? = 9908.221$$

$$9910.567 - ? = 9908.221$$

$$? = 9910.567 - 9908.221$$

$$? = 2.346$$

49. If $0.08x + 0.04y = 10$ and $0.2(x-1) + 0.4y = 24.8$ then find the value of x.
 (a) 125 (b) 150
 (c) 1.25 (d) 12.5

RRB NTPC 16.04.2016 Shift : 1

Ans : (a) From the question,

$$0.08x + 0.04y = 10$$

$$\Rightarrow \frac{8}{100}x + \frac{4}{100}y = 10$$

$$\Rightarrow 8x + 4y = 1000$$

$$\Rightarrow 2x + y = 250 \dots\dots(i)$$

Again

$$0.2(x-1) + 0.4y = 24.8$$

$$\Rightarrow 2(x-1) + 4y = 248$$

$$\Rightarrow 2x - 2 + 4y = 248$$

$$\Rightarrow 2x + 4y = 250$$

$$\Rightarrow x + 2y = 125 \dots\dots(ii)$$

Multiplying 2 in equation (i) and subtracting equation (ii).

$$4x - x = 500 - 125$$

$$\Rightarrow 3x = 375$$

$$x = 125$$

Type - 4

Problems Based on Simplification of Decimal and Fractional Expressions

50. Simplify the following expression :

$$3.5 \times 0.5 \times (4.4 - 0.625 \div 1.5625)$$

- (a) 10.5 (b) 7
 (c) 14 (d) 1.75

RRB NTPC (Stage-2) 17/06/2022 (Shift-III)

Ans. (b) : $3.5 \times 0.5 \times (4.4 - 0.625 \div 1.5625)$

$$= 1.75 \times (4.4 - 0.4)$$

$$= 1.75 \times 4 = 7$$

51. Find the value of

$$\frac{(34.2 \times 6.84) \div (102.6 \times 0.00171)}{(12.5 \times 0.8) \div 0.03}$$

- (a) 4 (b) 0.004
 (c) 0.04 (d) 0.4

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

Ans. (a) : According to the question

$$\frac{(34.2 \times 6.84) \div (102.6 \times 0.00171)}{(12.5 \times 0.8) \div 0.03}$$

$$= \frac{34.2 \times 6.84}{(102.6 \times 0.00171)} \times \frac{0.03}{(12.5 \times 0.8)}$$

$$= \frac{34.2 \times 6.84 \times 0.03}{102.6 \times 0.00171 \times 12.5 \times 0.8}$$

$$= \frac{342 \times 684 \times 3 \times 1000}{1026 \times 171 \times 125 \times 8}$$

$$= 4$$

52. Find the value of

$$\frac{\left(11\frac{11}{12} \times 1\frac{3}{13} \div 2\frac{3}{4}\right) \div \left(\frac{7}{10} \div \left(\frac{3}{4} \times 1\frac{2}{5}\right)\right)}{\frac{1}{4} \times \frac{2}{3} \times 2\frac{2}{5}}$$

- (a) 10 (b) $3\frac{1}{5}$ (c) $1\frac{1}{5}$ (d) 20

RRB NTPC (Stage-2) 13/06/2022 (Shift-II)

Ans. (d) :

$$\begin{aligned} & \frac{\left(11\frac{11}{12} \times 1\frac{3}{13} \div 2\frac{3}{4}\right) \div \left[\frac{7}{10} \div \left(\frac{3}{4} \times 1\frac{2}{5}\right)\right]}{\frac{1}{4} \times \frac{2}{3} \times 2\frac{2}{5}} \\ &= \frac{\left(\frac{143}{12} \times \frac{16}{13} \times \frac{4}{11}\right) \div \left[\frac{7}{10} \div \left(\frac{3}{4} \times \frac{7}{5}\right)\right]}{\frac{1}{4} \times \frac{2}{3} \times \frac{12}{5}} \\ &= \frac{\left(\frac{143}{12} \times \frac{16}{13} \times \frac{4}{11}\right) \div \left[\frac{7}{10} \times \frac{20}{21}\right]}{\frac{1}{4} \times \frac{2}{3} \times \frac{12}{5}} \\ &= \frac{\frac{16}{3} \times \frac{21}{14}}{\frac{2}{5}} \\ &= \frac{\frac{16}{2}}{\frac{2}{5}} = \frac{16}{2} \times \frac{5}{2} = \frac{80}{4} \\ &= \frac{5}{20} \end{aligned}$$

53. Simplify the following expression.

$$(5.5)^3 - 4^3$$

$$30.25 + 22 + 16$$

- (a) 0.75 (b) 14.25
(c) 1.5 (d) 9.5

RRB NTPC (Stage-2) 16/06/2022 (Shift-II)

Ans. (c) : Given expression -

$$\begin{aligned} & \frac{(5.5)^3 - 4^3}{30.25 + 22 + 16} \\ &= \frac{(5.5 - 4)(30.25 + 22 + 16)}{(30.25 + 22 + 16)} \\ & [(a^3 - b^3) = (a - b)(a^2 + ab + b^2)] \\ &= 5.5 - 4 \\ &= 1.5 \end{aligned}$$

54. Simplify the following expression :

$$2\frac{1}{6} \times \left\{1\frac{19}{26} + \frac{15}{13} \times \left(\frac{5}{7} \div \frac{25}{14}\right)\right\}$$

- (a) $4\frac{5}{6}$ (b) $4\frac{3}{4}$
(c) $4\frac{4}{5}$ (d) $4\frac{2}{3}$

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

Ans. (b) :

$$\begin{aligned} & 2\frac{1}{6} \times \left\{1\frac{19}{26} + \frac{15}{13} \times \left(\frac{5}{7} \div \frac{25}{14}\right)\right\} \\ &= \frac{13}{6} \times \left\{\frac{45}{26} + \frac{15}{13} \times \frac{5}{7} \times \frac{14}{25}\right\} \\ &= \frac{13}{6} \times \left\{\frac{45}{26} + \frac{6}{13}\right\} \\ &= \frac{13}{6} \times \left(\frac{45 + 12}{26}\right) \\ &= \frac{13}{6} \times \frac{57}{26} = \frac{19}{4} = 4\frac{3}{4} \end{aligned}$$

55. $\frac{9}{15} \times \frac{45}{81} \times \left\{\frac{49}{6} \times \left(\frac{16}{7} - 2\right)\right\} \times \frac{24}{5} \div \frac{16}{15} = ?$

- (a) $\frac{5}{9}$ (b) $\frac{9}{5}$ (c) $\frac{2}{7}$ (d) $\frac{7}{2}$

RRB NTPC (Stage-2) 12/06/2022 (Shift-I)

Ans. (d) :

$$\begin{aligned} & \frac{9}{15} \times \frac{45}{81} \times \left\{\frac{49}{6} \times \left(\frac{16}{7} - 2\right)\right\} \times \frac{24}{5} \div \frac{16}{15} = ? \\ &= \frac{9}{15} \times \frac{45}{81} \times \left\{\frac{49}{6} \times \frac{2}{7}\right\} \times \frac{24}{5} \div \frac{16}{15} = ? \\ &= \frac{9}{15} \times \frac{45}{81} \times \frac{7}{3} \times \frac{24}{5} \div \frac{16}{15} = ? \\ &= \frac{9}{15} \times \frac{45}{81} \times \frac{7}{3} \times \frac{24}{5} \times \frac{15}{16} = ? \\ & \boxed{\frac{7}{2} = ?} \end{aligned}$$

56. Find the value of $\frac{3}{4} \times 2\frac{2}{3} \div \frac{5}{9}$ of $1\frac{1}{5} - \frac{3}{5}$ of

$$\left(\frac{2}{3} \div \frac{2}{3} \text{ of } \frac{3}{2}\right) + \frac{4}{5} \times 1\frac{1}{9} \div \frac{8}{15} - \frac{2}{3}$$

- (a) $1\frac{3}{10}$ (b) $4\frac{2}{5}$ (c) $3\frac{9}{10}$ (d) $3\frac{3}{5}$

RRB NTPC (Stage-2) 16/06/2022 (Shift-I)

Ans. (d) :

$$\begin{aligned} & \frac{3}{4} \times 2\frac{2}{3} \div \frac{5}{9} \text{ of } 1\frac{1}{5} - \frac{3}{5} \text{ of } \left(\frac{2}{3} \div \frac{2}{3} \text{ of } \frac{3}{2}\right) + \frac{4}{5} \times 1\frac{1}{9} \div \frac{8}{15} - \frac{2}{3} \\ &= \frac{3}{4} \times \frac{8}{3} \div \frac{2}{3} - \frac{3}{5} \text{ of } \left(\frac{2}{3}\right) + \frac{4}{5} \times \frac{25}{12} - \frac{2}{3} \\ &= \frac{3}{4} \times \frac{8}{3} \times \frac{3}{2} - \frac{2}{5} + \frac{5}{3} - \frac{2}{3} \\ &= 3 - \frac{2}{5} + \frac{3}{3} \\ &= 3 - \frac{2}{5} + 1 \\ &= 4 - \frac{2}{5} \\ &= \frac{18}{5} \\ &= 3\frac{3}{5} \end{aligned}$$

57. Find the value of $(919+9.019+0.919+9.0019)$

- (a) 937.3999 (b) 973.9399
(c) 937.9399 (d) 973.9939

RRB NTPC (Stage-2) 14/06/2022 (Shift-I)

$$\begin{aligned}\text{Ans. (c) : } & 919 + 9.019 + 0.919 + 9.0019 \\ & = 919 + 18.9399 \\ & = 937.9399\end{aligned}$$

58. $484.71 + 285.33 - 827.38 + 73.9 = ?$

- (a) 19.78 (b) 36.54
(c) 16.56 (d) 15.78

RRB NTPC (Stage-2) 17/06/2022 (Shift-I)

$$\begin{aligned}\text{Ans. (c) : } & 484.71 + 285.33 - 827.38 + 73.9 = ? \\ & = 484.71 + 285.33 + 73.9 - 827.38 \\ & = 843.94 - 827.38 \\ & = 16.56\end{aligned}$$

59. Which of the following options is the closest approximate value which will come in place of question mark (?) in the following equation?

$$67.69 + 5.12 - 0.89 \div 31.88 = ?$$

- (a) 150 (b) 35
(c) 73 (d) 48

RRB NTPC (Stage-2) 12/06/2022 (Shift-I)

$$\text{Ans. (c) : } 67.69 + 5.12 - 0.89 \div 31.88 = ?$$

Assuming approximately

$$\begin{aligned}& = 68 + 5 - \frac{1}{32} \\ & = 73 - 0.031 \approx 73\end{aligned}$$

60. Which of the following options is the closest approximate value which will come in place of question mark (?) in the following equation?

$$895.98 + 185.01 + 851.86 + 524.09 = ?$$

- (a) 2460 (b) 1490
(c) 2010 (d) 3540

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

$$\text{Ans. (a) : } 895.98 + 185.01 + 851.86 + 524.09$$

Almost assuming

$$\begin{aligned}& = 896 + 185 + 852 + 524 \\ & = 2457 \approx 2460\end{aligned}$$

61. $19 \times 19 = 361$. What will be the value of 190×0.0019 ?

- (a) 0.00361 (b) 0.361
(c) 3.61 (d) 0.0361

RRB NTPC 17.02.2021 (Shift-II) Stage I

$$\text{Ans. (b) : } 19 \times 19 = 361$$

$$\begin{aligned}\Rightarrow & 190 \times 0.0019 \\ & = 0.361\end{aligned}$$

62. Find the quotient of $0.5 \div 0.71$ (correct to three decimal places)

- (a) 0.706 (b) 0.714
(c) 0.705 (d) 0.704

RRB NTPC 03.02.2021 (Shift-II) Stage I

Ans. (d) : Given that,

$$\frac{0.5}{0.71} = \frac{500}{710} = 0.704$$

63. Simplify the following.

$$5 \times 0.5 \times 0.05 \times 0.005 \times 500$$

- (a) 3125 (b) 0.3125
(c) 0.003125 (d) 31.25

RRB NTPC 28.01.2021 (Shift-I) Stage I

$$\text{Ans. (b) : } 5 \times 0.5 \times 0.05 \times 0.005 \times 500$$

$$\begin{aligned}& = 5 \times \frac{5}{10} \times \frac{5}{100} \times \frac{5}{1000} \times 500 \\ & = \frac{5 \times 5 \times 5 \times 5 \times 5}{10000} = \frac{3125}{10000} \\ & = 0.3125\end{aligned}$$

64. What will be the value after simplifying this continued fraction?

$$\frac{1}{2 + \frac{1}{3 + \frac{1}{1 + \frac{1}{4}}}}$$

- (a) $\frac{19}{43}$ (b) $\frac{43}{19}$
(c) $\frac{5}{19}$ (d) $\frac{43}{5}$

RRB NTPC 03.02.2021 (Shift-II) Stage I

Ans. (a) :

$$\begin{aligned}& \frac{1}{2 + \frac{1}{3 + \frac{1}{1 + \frac{1}{4}}}} \\ & = \frac{1}{2 + \frac{1}{3 + \frac{1}{\frac{5}{4}}}} \\ & = \frac{1}{2 + \frac{1}{3 + \frac{4}{5}}} \\ & = \frac{1}{2 + \frac{1}{\frac{19}{5}}} = \frac{1}{2 + \frac{5}{19}} \\ & = \frac{1}{\frac{43}{19}} = \frac{19}{43}\end{aligned}$$

65. Simplify the given expression

$$4\frac{1}{10} - \left[2\frac{1}{2} - \left\{ \frac{5}{6} - \left(\frac{2}{5} + \frac{3}{10} \right) \right\} \right]$$

- (a) $\frac{19}{15}$ (b) $\frac{12}{25}$
(c) $\frac{31}{25}$ (d) $\frac{26}{15}$

RRB NTPC 28.01.2021 (Shift-I) Stage I

Ans. (d) : According to the question,

$$\begin{aligned} & 4\frac{1}{10} - \left[2\frac{1}{2} - \left\{ \frac{5}{6} - \left(\frac{2}{5} + \frac{3}{10} \right) \right\} \right] \\ &= \frac{41}{10} - \left[\frac{5}{2} - \left\{ \frac{5}{6} - \frac{7}{10} \right\} \right] \\ &= \frac{41}{10} - \left[\frac{5}{2} - \left\{ \frac{25-21}{30} \right\} \right] \\ &= \frac{41}{10} - \left[\frac{5}{2} - \frac{4}{30} \right] \\ &= \frac{41}{10} - \left[\frac{75-4}{30} \right] \\ &= \frac{41}{10} - \frac{71}{30} \\ &= \frac{123-71}{30} = \frac{52}{30} \\ &= \frac{26}{15} \end{aligned}$$

66. Solve the following

$$\frac{1}{2} \left[\frac{3}{4} - \left\{ \frac{1}{4} - (-5-3) \right\} \right]$$

- (a) $3\frac{3}{4}$ (b) $3\frac{1}{4}$
(c) $-3\frac{3}{4}$ (d) $-3\frac{1}{4}$

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (c)
$$\begin{aligned} & \frac{1}{2} \left[\frac{3}{4} - \left\{ \frac{1}{4} - (-5-3) \right\} \right] \\ &= \frac{1}{2} \left[\frac{3}{4} - \left\{ \frac{1}{4} - (-8) \right\} \right] \\ &= \frac{1}{2} \left[\frac{3}{4} - \left\{ \frac{1}{4} + 8 \right\} \right] \\ &= \frac{1}{2} \left[\frac{3}{4} - \frac{33}{4} \right] \\ &= \frac{1}{2} \left(-\frac{30}{4} \right) \\ &= \frac{-15}{4} \text{ or } -3\frac{3}{4} \end{aligned}$$

67. Simplify the given expression.

$$\frac{5+5 \times 5}{5 \times 5+5} \times \frac{\frac{1}{5} \div \left(\frac{1}{5} \times \frac{1}{5} \right)}{\left(\frac{1}{5} \times \frac{1}{5} \right) \div \frac{1}{5}} - \left(5 - \frac{1}{5} \right) \times \frac{10}{2}$$

- (a) 3 (b) 1
(c) 0 (d) 2

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\begin{aligned} & \frac{5+5 \times 5}{5 \times 5+5} \times \frac{\frac{1}{5} \div \left(\frac{1}{5} \times \frac{1}{5} \right)}{\left(\frac{1}{5} \times \frac{1}{5} \right) \div \frac{1}{5}} - \left(5 - \frac{1}{5} \right) \times \frac{10}{2} \\ &= \frac{30}{30} \times \frac{25/5}{5/25} - \frac{24}{5} \times \frac{10}{2} \\ &= 1 \times 25 - 24 \\ &= 25 - 24 = 1 \end{aligned}$$

68. If $P = 2 + 0.2 \div (0.2 \times 2) - 1 \times 2$, $Q = 2 - 0.2 \div (0.2 \times 2) - \frac{1}{2} \times 2$, then $\frac{P}{Q}$ is the equal to:

- (a) 0.5 (b) 1.0
(c) 1.5 (d) -0.5

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) : From question,

$$P = 2 + 0.2 \div (0.2 \times 2) - 1 \times 2,$$

$$Q = 2 - 0.2 \div (0.2 \times 2) - \frac{1}{2} \times 2$$

$$P = 2 + 0.2 \times \frac{1}{0.4} - 2, \quad Q = 2 - 0.2 \times \frac{1}{0.4} - 1$$

$$P = 0.5 \quad Q = 0.5$$

$$\therefore \frac{P}{Q} = \frac{0.5}{0.5} = 1$$

69. If $P = 0.3 \times 0.3 + 0.03 \times 0.03 - 0.6 \times 0.03$ and $Q = 0.54$, then $\frac{P}{Q}$ is equal to:

- (a) 0.45 (b) 4.5
(c) 0.135 (d) 4.05

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (c) : $P = 0.3 \times 0.3 + 0.03 \times 0.03 - 0.6 \times 0.03$

$$P = 0.09 + 0.0009 - 0.018$$

$$P = 0.0729$$

$$Q = 0.54$$

$$\therefore \frac{P}{Q} = \frac{0.0729}{0.54} = \frac{729}{5400} = 0.135$$

70. Solve the following

$$\left\{ 1 - \frac{1}{4} \right\} \left\{ 1 - \frac{2}{4} \right\} \dots \left\{ 1 - \frac{5}{4} \right\} \left\{ 1 - \frac{6}{4} \right\} = ?$$

- (a) $\frac{3}{64}$ (b) 0
(c) $\frac{3}{256}$ (d) $-\frac{3}{256}$

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (b) : from question,

$$\begin{aligned} & \left\{ 1 - \frac{1}{4} \right\} \left\{ 1 - \frac{2}{4} \right\} \dots \left\{ 1 - \frac{5}{4} \right\} \left\{ 1 - \frac{6}{4} \right\} \\ &= \left(1 - \frac{1}{4} \right) \left(1 - \frac{2}{4} \right) \left(1 - \frac{3}{4} \right) \left(1 - \frac{4}{4} \right) \left(1 - \frac{5}{4} \right) \left(1 - \frac{6}{4} \right) \end{aligned}$$

$$\begin{aligned} &= \frac{3}{4} \times \frac{2}{4} \times \frac{1}{4} \times 0 \times -\frac{1}{4} \times -\frac{2}{4} \\ &= 0 \end{aligned}$$

71. Simplify

$$25 \div 10 - \left\{ \frac{7}{4} \times \frac{1}{3} \right\} \times \frac{6}{5} + \frac{14}{3} \times \frac{9}{10} - \left\{ \frac{1}{5} \div \frac{1}{25} \right\}$$

- (a) 1 (b) 11
(c) 5 (d) 10

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (a) : Given,

$$\begin{aligned} & 25 \div 10 - \left\{ \frac{7}{4} \times \frac{1}{3} \right\} \times \frac{6}{5} + \frac{14}{3} \times \frac{9}{10} - \left\{ \frac{1}{5} \div \frac{1}{25} \right\} \\ &= 25 \div 10 - \left\{ \frac{7}{12} \right\} \times \frac{6}{5} + \frac{21}{5} - \left[\frac{1}{5} \times 25 \right] \\ &= 25 \div 10 - \left\{ \frac{7}{12} \right\} \times \frac{6}{5} + \frac{21}{5} - 5 \\ &= 25 \div 10 - \left\{ \frac{7}{12} \right\} \times \frac{6}{5} + \left(-\frac{4}{5} \right) \\ &= 25 \div 10 - \frac{7}{10} - \frac{4}{5} \\ &= \frac{25}{10} - \frac{7}{10} - \frac{4}{5} \\ &= \frac{25}{10} - \frac{7}{10} - \frac{8}{10} = \frac{25}{10} - \frac{15}{10} = \frac{10}{10} = 1 \end{aligned}$$

72. Find the value of $777\frac{1}{5} + 777\frac{2}{5} + 777\frac{3}{5} + 777\frac{4}{5}$

- (a) 3000 (b) 3018
(c) 3108 (d) 3110

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (d) :

$$\begin{aligned} & 777\frac{1}{5} + 777\frac{2}{5} + 777\frac{3}{5} + 777\frac{4}{5} \\ &= 4 \times 777 + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} \\ &= 3108 + \frac{10}{5} = 3108 + 2 = 3110 \end{aligned}$$

73. The value of $\frac{1}{4} + \frac{1}{4 \times 5} + \frac{1}{4 \times 5 \times 6}$, correct to four decimal places, is

- (a) 0.3150 (b) 0.3140
(c) 0.3092 (d) 0.3083

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (d) : Given expression,

$$\begin{aligned} & \frac{1}{4} + \frac{1}{4 \times 5} + \frac{1}{4 \times 5 \times 6} \\ &= \frac{1}{4} + \frac{1}{20} + \frac{1}{120} \\ &= \frac{30+6+1}{120} = \frac{37}{120} = 0.3083 \end{aligned}$$

74. The value of $\left(35.7 - \left(3 + \frac{1}{3 + \frac{1}{3}} \right) - \left(2 + \frac{1}{2 + \frac{1}{2}} \right) \right)$

- (a) 34.8 (b) 36.6
(c) 30 (d) 35

RRB NTPC 11.03.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$\begin{aligned} & \left(35.7 - \left(3 + \frac{1}{3 + \frac{1}{3}} \right) - \left(2 + \frac{1}{2 + \frac{1}{2}} \right) \right) \\ &= \left(35.7 - \left(3 + \frac{1}{\frac{10}{3}} \right) - \left(2 + \frac{1}{\frac{5}{2}} \right) \right) \\ &= \left(35.7 - \left(3 + \frac{3}{10} \right) - \left(2 + \frac{2}{5} \right) \right) \\ &= 35.7 - \frac{33}{10} - \frac{12}{5} \\ &= 35.7 - 3.3 - 2.4 \\ &= 35.7 - 5.7 = 30.0 \end{aligned}$$

75. Simplify the following.

$$240 \div \frac{5}{1 \div \frac{4}{1 \div \frac{5}{1 \div 3}}}$$

- (a) $\frac{4}{3}$ (b) $\frac{5}{3}$
(c) $\frac{4}{5}$ (d) $\frac{5}{4}$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (c) : Given question,

$$\begin{aligned} & 240 \div \frac{5}{1 \div \frac{4}{1 \div \frac{5}{1 \div 3}}} \\ &= 240 \div \frac{5}{1 \div \frac{4}{1 \div \frac{5}{1/3}}} \\ &= 240 \div \frac{5}{1 \div \frac{4}{1 \div 15}} \\ &= 240 \div \frac{5}{1 \div \frac{4}{15}} \\ &= 240 \div \frac{5}{\frac{4}{15}} \\ &= 240 \div \frac{5 \times 15}{4} \\ &= \frac{240}{300} = \frac{4}{5} \end{aligned}$$

76. Solve : $(0.25 \times 0.004) + 0.374 - 0.72 = ?$

- (a) -0.345 (b) 0.325
(c) 1.94 (d) -0.945

RRB NTPC 04.04.2016 Shift : 2

$$\begin{aligned} \text{Ans : (a)} & (0.25 \times 0.004) + 0.374 - 0.72 \\ &= 0.001 - 0.346 \\ &= -0.345 \end{aligned}$$

77. Solve the following ?

$$176 + 17.6 + 1.76 + 0.176 + 0.0176 = ?$$

- (a) 195.5536 (b) 195.5556
(c) 195.5356 (d) 195.5336

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given that,

$$176 + 17.6 + 1.76 + 0.176 + 0.0176$$

$$\begin{array}{r} 176.0000 \\ 17.6000 \\ 1.7600 \\ 0.1760 \\ + 0.0176 \\ \hline = 195.5536 \end{array}$$

78. Simplify the given expression.

$$9 \times 0.9 \times 0.09 \times 0.009 \times \frac{1}{0.3} \times \frac{1}{0.03} \times \frac{1}{0.003}$$

- (a) 0.243 (b) 2.43
(c) 243 (d) 24.3

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c) : $9 \times 0.9 \times 0.09 \times 0.009 \times \frac{1}{0.3} \times \frac{1}{0.03} \times \frac{1}{0.003}$

$$= 9 \times \frac{9}{10} \times \frac{9}{100} \times \frac{9}{1000} \times \frac{10}{3} \times \frac{100}{3} \times \frac{1000}{3}$$

$$= 9 \times 9 \times 9 \times 9 \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3}$$

$$= 243$$

79. Solve the following

$$3.03 + 31.003 + 13.33 + 3.331$$

- (a) 35.97 (b) 50.370
(c) 50.694 (d) 3.597

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,
 $3.03 + 31.003 + 13.33 + 3.331$
 $= 50.694$

80. Solve the following

$$6202.5 + 620.25 + 62.025 + 6.2025 + 0.62025 = ?$$

- (a) 6891.59675 (b) 5892.59775
(c) 6791.59775 (d) 6891.59775

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (d) : According to the question,
 $6202.5 + 620.25 + 62.025 + 6.2025 + 0.62025$
 $= 6891.59775$

81. Solve the following :

$$17.6 + 1.76 + 0.176 + 0.0176 + 0.00176 = ?$$

- (a) 19.55356 (b) 19.55336
(c) 19.55556 (d) 19.55536

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : $17.6 + 1.76 + 0.176 + 0.0176 + 0.00176$
 $= 19.36 + 0.176 + 0.0176 + 0.00176$
 $= 19.536 + 0.0176 + 0.00176$
 $= 19.5536 + 0.00176$
 $= 19.55536$

82. Find the value of $7 \times 0.7 \times 0.07 \times 0.007 \times 70$:

- (a) 1.6807 (b) 0.016807
(c) 0.0016807 (d) 0.16807

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) : From question,

$$\begin{aligned} & 7 \times 0.7 \times 0.07 \times 0.007 \times 70 \\ &= 4.9 \times 0.07 \times 0.49 \\ &= 0.16807 \end{aligned}$$

83. Simplify

$$8.8 + .08 + 8.88 + .808$$

- (a) 18.568 (b) 2.656
(c) 1.792 (d) 185.68

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (a) : $8.8 + .08 + 8.88 + .808 = 18.568$

84. Solve the following

$$\left(\frac{1}{5}x - \frac{1}{6}y\right)(5x + 6y) = ?$$

- (a) $x^2 + \frac{11xy}{30} - y^2$ (b) $x^2 + \frac{11xy}{30} - y^2$
(c) $x^2 + \frac{11xy}{30} - y$ (d) Y^2

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (a) :

$$\begin{aligned} & \left(\frac{1}{5}x - \frac{1}{6}y\right)(5x + 6y) \\ &= \frac{5x^2}{5} + \frac{6xy}{5} - \frac{5xy}{6} - \frac{6y^2}{6} \\ &= x^2 + \frac{36xy - 25xy}{30} - y^2 \\ &= x^2 + \frac{11xy}{30} - y^2 \end{aligned}$$

85. $\left[\frac{1.93 \times 19.3 - 2.07 \times 20.7}{19.3 - 20.7} \right]$ equals to:

- (a) 0.40 (b) 4.00
(c) 40 (d) 0.04

RRB NTPC 18.04.2016 Shift : 2

Ans : (b) From the given expression,

$$\begin{aligned} & \frac{1.93 \times 19.3 - 2.07 \times 20.7}{19.3 - 20.7} \\ &= \frac{10(1.93 \times 1.93) - 10(2.07 \times 2.07)}{10(1.93 - 2.07)} \\ &= \frac{(1.93)^2 - (2.07)^2}{(1.93 - 2.07)} \\ &= \frac{(1.93 + 2.07)(1.93 - 2.07)}{(1.93 - 2.07)} \\ &= 1.93 + 2.07 = 4 \end{aligned}$$

86. Simplification of

$$\frac{0.2 \times 0.2 + 0.02 \times 0.02 - 0.4 \times 0.02}{0.36}$$

- (a) 2.199 (b) 0.09
(c) 2 (d) 3.195

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (b) :
$$\frac{0.2 \times 0.2 + 0.02 \times 0.02 - 0.4 \times 0.02}{0.36}$$

 From Formula $\therefore a^2 + b^2 - 2ab = (a - b)^2$

$$= \frac{(0.2)^2 + (0.02)^2 - 2 \times 0.2 \times 0.02}{0.36}$$

$$= \frac{(0.2 - 0.02)^2}{0.36}$$

$$= \frac{(0.18)^2}{0.36} = 0.09$$

87. If $65 \times 65 = 4225$, then the value of $6.5 \times 6.5 = ?$

- (a) 422.5 (b) 42.25
 (c) 42025 (d) 0.004225

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (b) :
 $\therefore 65 \times 65 = 4225$
 $\therefore 6.5 \times 6.5 = 65 \times 65 \times 0.01$
 $= 4225 \times 0.01$
 $= 42.25$

88. Find the value of

$$\frac{(0.03)^2 + (0.51)^2 + (0.083)^2}{(0.003)^2 + (0.051)^2 + (0.0083)^2}$$

(a) 100 (b) 10
 (c) 0.1 (d) 1000

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (a) : From question,

$$\frac{(0.03)^2 + (0.51)^2 + (0.083)^2}{(0.003)^2 + (0.051)^2 + (0.0083)^2}$$

$$= \frac{100[(0.003)^2 + (0.051)^2 + (0.0083)^2]}{(0.003)^2 + (0.051)^2 + (0.0083)^2}$$

 $= 100$

89. Find the value of $\frac{0.5 \times 0.5 + 0.09 - 0.15}{0.125 + 0.027}$.

- (a) $\frac{5}{4}$ (b) $\frac{5}{6}$ (c) $\frac{4}{5}$ (d) $\frac{3}{4}$

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (a) :
$$\frac{0.5 \times 0.5 + 0.09 - 0.15}{0.125 + 0.027}$$

$$= \frac{0.5 \times 0.5 + 0.3 \times 0.3 - 0.5 \times 0.3}{(0.5)^3 + (0.3)^3}$$

$$= \frac{(0.5)^2 + (0.3)^2 - (0.5) \times (0.3)}{(0.5 + 0.3) \{ (0.5)^2 + (0.3)^2 - (0.5) \times (0.3) \}}$$

$$\left\{ \because x^3 + y^3 = (x + y)(x^2 + y^2 - xy) \right\}$$

$$= \frac{1}{(0.5 + 0.3)} = \frac{1}{0.8} = \frac{5}{4}$$

90. Find the value

$$\frac{(0.01)^2 + (0.22)^2 + (0.333)^2 + (0.4444)^2}{(0.001)^2 + (0.022)^2 + (0.0333)^2 + (0.04444)^2}$$

(a) 50 (b) 75 (c) 125 (d) 100

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (d) :

$$\frac{(0.01)^2 + (0.22)^2 + (0.333)^2 + (0.4444)^2}{(0.001)^2 + (0.022)^2 + (0.0333)^2 + (0.04444)^2}$$

$$= (10)^2 \left[\frac{((1)^2 + (22)^2 + (333)^2 + (4444)^2)}{(1)^2 + (22)^2 + (333)^2 + (4444)^2} \right]$$

$$= 100$$

Type - 5 Miscellaneous

91. A pillar is divided into three parts. The first part is $\frac{1}{4}$ of the whole, second part is $\frac{4}{8}$ of the first, and the third is 10 m. The length of the pillar is:

- (a) 18 m (b) 16 m
 (c) 20 m (d) 22 m

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let total length of pillar is $32x$ meters

Hence, length of first part = $32x \times \frac{1}{4} = 8x$

Length of second part = $8x \times \frac{4}{8} = 4x$

Length of third part = $32x - (8x + 4x) = 20x$

According to the question,

$$10 = 20x$$

$$x = \frac{1}{2}$$

Hence, the length of pillar = $32x$

$$= 32 \times \frac{1}{2} = 16 \text{ meters.}$$

92. Given that $a = \sqrt{4}$, find the value of the following.

$$\sqrt{9} + 25a + \sqrt{64}$$

- (a) 51 (b) 61
 (c) 41 (d) 31

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (b) : Given, $a = \sqrt{4} = 2$

According to the question,

$$\begin{aligned} & \sqrt{9} + 25a + \sqrt{64} \\ &= 3 + 25 \times 2 + 8 \\ &= 3 + 50 + 8 \\ &= 61 \end{aligned}$$

93. Simplify the given expression using BODMAS :

$$\frac{4}{11} \times \frac{121}{16} \times 24(75^2 - 55^2) \times \frac{1}{100}$$

- (a) 1736 (b) 1726
 (c) 1746 (d) 1716

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (d) : $\frac{4}{11} \times \frac{121}{16} \times 24(75^2 - 55^2) \times \frac{1}{100}$

From BODMAS,

$$= \frac{11}{4} \times 24[(75 + 55)(75 - 55)] \times \frac{1}{100}$$

We know that, $[\because a^2 - b^2 = (a + b)(a - b)]$

$$= 66 \times (130 \times 20) \times \frac{1}{100}$$

$$= 66 \times 2600 \times \frac{1}{100}$$

$$= 1716$$

94. If $x = \frac{\sqrt{3}}{2}$, **then find the value of**
 $\sqrt{1+x} + \sqrt{1-x}$.

- (a) $2 - \sqrt{3}$ (b) $\frac{\sqrt{3}}{2}$
 (c) 3 (d) $2 + \sqrt{3}$

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$x = \frac{\sqrt{3}}{2}$$

Then, $\sqrt{1+x} + \sqrt{1-x} = ?$

On taking the square,

$$\begin{aligned} (\sqrt{1+x} + \sqrt{1-x})^2 &= (\sqrt{1+x})^2 + (\sqrt{1-x})^2 + 2\sqrt{1+x}\sqrt{1-x} \\ &= 1+x+1-x+2\sqrt{(1+x)(1-x)} \\ &= 2+2\sqrt{1-x^2} \\ &= 2+2\sqrt{\frac{4-3}{4}} \\ &= 2+2\sqrt{\frac{1}{4}} \\ &= 2+2 \times \frac{1}{2} \\ &= 2+1 \\ &= 3 \end{aligned}$$

95. If $(\sqrt{5}+1)^2 = a+b\sqrt{5}$, **then find a, b where (a>b)**

- (a) 4, 2 (b) 6, 2
 (c) 6, 4 (d) 8, 6

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (b) :

$$(\sqrt{5}+1)^2 = a+b\sqrt{5}$$

$$5+1+2\sqrt{5} = a+b\sqrt{5}$$

$$6+2\sqrt{5} = a+b\sqrt{5}$$

On comparing the both sides,

$$a = 6$$

$$b = 2$$

96. Find the value

$$\frac{1}{5 \times 8} + \frac{1}{8 \times 11} + \frac{1}{11 \times 14} + \frac{1}{14 \times 17}$$

- (a) $\frac{4}{17}$ (b) $\frac{4}{85}$
 (c) $\frac{24}{85}$ (d) $\frac{2}{85}$

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\begin{aligned} &\frac{1}{5 \times 8} + \frac{1}{8 \times 11} + \frac{1}{11 \times 14} + \frac{1}{14 \times 17} \\ &= \frac{1}{3} \left[\frac{1}{5} - \frac{1}{8} + \frac{1}{8} - \frac{1}{11} + \frac{1}{11} - \frac{1}{14} + \frac{1}{14} - \frac{1}{17} \right] \\ &= \frac{1}{3} \left[\frac{1}{5} - \frac{1}{17} \right] \\ &= \frac{4}{85} \end{aligned}$$

97. For $x > 0$ **find the value of**

$$\left(1 + \frac{1}{x+1}\right) \left(1 + \frac{1}{x+2}\right) \left(1 + \frac{1}{x+3}\right) \left(1 + \frac{1}{x+4}\right)$$

- (a) $1 + \frac{1}{x+5}$ (b) $\frac{1}{x+5}$
 (c) $\frac{x+1}{x+5}$ (d) $\frac{x+5}{x+1}$

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (d) : $\left(1 + \frac{1}{x+1}\right) \left(1 + \frac{1}{x+2}\right) \left(1 + \frac{1}{x+3}\right) \left(1 + \frac{1}{x+4}\right)$

$$\begin{aligned} &= \left(\frac{x+1+1}{x+1}\right) \left(\frac{x+2+1}{x+2}\right) \left(\frac{x+3+1}{x+3}\right) \left(\frac{x+4+1}{x+4}\right) \\ &= \left(\frac{x+2}{x+1}\right) \left(\frac{x+3}{x+2}\right) \left(\frac{x+4}{x+3}\right) \left(\frac{x+5}{x+4}\right) \\ &= \frac{(x+2)}{(x+1)} \times \frac{(x+3)}{(x+2)} \times \frac{(x+4)}{(x+3)} \times \frac{(x+5)}{(x+4)} \\ &= \frac{x+5}{x+1} \end{aligned}$$

98. On simplification $\frac{2^{10} - 3^{10}}{5^{10} - 6^{10}}$ **is:**

- (a) A positive rational number
 (b) A negative rational number
 (c) Neither a positive nor a negative rational number
 (d) Can not be defined

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : From question,

$$\begin{aligned} \frac{2^{10} - 3^{10}}{5^{10} - 6^{10}} &= \frac{1024 - 59049}{9765625 - 60466176} = \frac{-58025}{-50700551} \\ &= \frac{58025}{50700551} \quad (\text{A positive rational number}) \end{aligned}$$

05.

Lowest Common Multiple & Highest Common Factor

Type - 1 Simple Problems Related to LCM

1. What is the LCM of 98, 28 and 112 ?

- (a) 784 (b) 1176 (c) 392 (d) 1568

RRB NTPC (Stage-2) 15/06/2022 (Shift-III)

Ans. (a) : LCM of 98, 28 and 112

$$98 = 7 \times 7 \times 2$$

$$28 = 7 \times 2 \times 2$$

$$112 = 2 \times 2 \times 2 \times 7$$

$$\text{L.C.M.} = 2 \times 2 \times 2 \times 7 \times 7 = 784$$

2. The LCM of two prime numbers x and y ($x > y$) is 119. The value of $3y - x$ is:

- (a) 2 (b) 4 (c) 8 (d) 6

RRB NTPC 14.03.2021 (Shift-I) Stage I

Ans. (b) : LCM = 119

$$\therefore \text{Numbers } x \text{ and } y = 17 \times 7$$

$$\therefore x = 17, y = 7$$

$$3y - x$$

$$= 3 \times 7 - 17$$

$$= 21 - 17 = 4$$

3. The L.C.M. of any two consecutive positive integers x and $x + 1$ is?

- (a) 1 (b) $x(x + 1)$
(c) x (d) $x + 1$

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (b) : LCM of x and $(x+1)$ = The LCM of any two consecutive positive integers is equal to the product of those numbers.

$$\therefore \text{LCM of } x \text{ and } (x + 1) = x(x + 1)$$

4. What is the LCM of 22, 24, 48 and 16

- (a) 48 (b) 528 (c) 64 (d) 176

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (b) : LCM of 22, 24, 48 and 16

$$\begin{array}{r} 2 \overline{) 22, 24, 48, 16} \\ 2 \overline{) 11, 12, 24, 8} \\ 2 \overline{) 11, 6, 12, 4} \\ 2 \overline{) 11, 3, 6, 2} \\ 2 \overline{) 11, 3, 3, 1} \\ 3 \overline{) 11, 3, 3, 1} \\ 11 \overline{) 11, 1, 1, 1} \\ 1, 1, 1, 1 \end{array}$$

$$= 2 \times 2 \times 2 \times 2 \times 3 \times 11 = 528$$

$$\text{LCM of } 22, 24, 48, 16 = 528$$

5. The LCM of 4, 6 and x CANNOT be:

- (a) 24 (b) 18
(c) 36 (d) 60

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (b) : L.C.M of 4, 6 and $x = 12x$

So, it is clear that the L.C.M of 4, 6 and x will be a multiple of 12.

The number given in option (b) is not a multiple of 12. Hence, L.C.M of 4, 6 and x can't be 18.

6. In which of the following that CANNOT be the L.C.M. of 3, 4 and x .

- (a) 60 (b) 24
(c) 18 (d) 36

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (c) : 18 cannot be the LCM of 3, 4 and x because 18 is not perfectly divisible by 4.

7. What is the LCM of $\sqrt[3]{169}$, $\sqrt[3]{27}$, $\sqrt[3]{64}$ and $\sqrt[3]{144}$

- (a) 156 (b) 312
(c) 182 (d) 468

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) : From question,

$$\sqrt[3]{169} = 13, \sqrt[3]{27} = 3, \sqrt[3]{64} = 4, \sqrt[3]{144} = 12$$

$$\begin{array}{r} 2 \overline{) 13, 3, 4, 12} \\ 2 \overline{) 13, 3, 2, 6} \\ 3 \overline{) 13, 3, 1, 3} \\ 13 \overline{) 13, 1, 1, 1} \\ 1, 1, 1, 1 \end{array}$$

$$\text{Hence, LCM} = 2 \times 2 \times 3 \times 13$$

$$= 156$$

8. Determine the LCM of $\frac{2}{3}, \frac{4}{9}, \frac{8}{15}$ and $\frac{10}{21}$.

- (a) $\frac{40}{3}$ (b) $\frac{3}{40}$ (c) $\frac{3}{20}$ (d) $\frac{20}{3}$

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (a) : LCM of $\frac{2}{3}, \frac{4}{9}, \frac{8}{15}$ and $\frac{10}{21}$

$$\text{LCM of given fractions} = \frac{\text{LCM of numerator}}{\text{HCF of denominator}}$$

$$\text{LCM} = \frac{(2, 4, 8, 10) \text{LCM}}{(3, 9, 15, 21) \text{HCF}} = \frac{40}{3}$$

9. The LCM of $8^2 \times 6^3$ and $4^6 \times 9^3$ is:

- (a) $2^9 \times 3^6$ (b) $2^9 \times 3^3$
(c) $2^{12} \times 3^3$ (d) $2^{12} \times 3^6$

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : From question,

$$8^2 \times 6^3 \rightarrow (2^3)^2 \times (2 \times 3)^3 = 2^6 \times 2^3 \times 3^3 = 2^9 \times 3^3 \dots\dots\dots(i)$$

$$4^6 \times 9^3 \rightarrow (2^2)^6 \times (3^2)^3 = 2^{12} \times 3^6 \dots\dots\dots(ii)$$

$$\text{LCM of equation (i) and (ii)} = 2^{12} \times 3^6$$

10. The LCM of $\frac{2}{3}, \frac{4}{9}, \frac{7}{12}, \frac{3}{5}$ is:

(a) 98 (b) 94 (c) 84 (d) 86

RRB NTPC 13.03.2021 (Shift-I) Stage Ist

Ans. (c) : L. C. M of $\frac{2}{3}, \frac{4}{9}, \frac{7}{12}, \frac{3}{5}$

$$\frac{\text{L.C.M. of numerator}}{\text{H.C.F. of denominator}} = \frac{\text{L.C.M. of } 2, 4, 7 \text{ and } 3}{\text{H.C.F. of } 3, 9, 12 \text{ and } 5}$$

$$= \frac{4 \times 7 \times 3}{1} = 84$$

11. Find the LCM of 0.63, 10.5, 2.1 and 4.20.

(a) 63 (b) 0.63 (c) 6.30 (d) 6300

RRB NTPC 16.04.2016 Shift : 1

Ans : (a) According to the question,

$$0.63 = \frac{63}{100}, 10.5 = \frac{105}{10}, 2.1 = \frac{21}{10}, 4.20 = \frac{420}{100} = \frac{42}{10}$$

So, the LCM of $\frac{63}{100}, \frac{105}{10}, \frac{21}{10}$ and $\frac{42}{10}$

$$= \frac{\text{LCM of } 63, 105, 21, 42}{\text{HCF of } 100, 10, 10, 10}$$

$$= \frac{21 \times 3 \times 5 \times 2}{10} = \frac{630}{10} = 63$$

12. LCM of $2^4 \times 3^4 \times 5^3$ and $2^2 \times 3^6 \times 5^5 \times 7^2$ is

(a) $2^3 \times 3^5 \times 5^4 \times 7$ (b) $2^2 \times 3^2 \times 5^2 \times 7^2$
(c) $2^6 \times 3^{10} \times 5^8 \times 7^2$ (d) $2^4 \times 3^6 \times 5^5 \times 7^2$

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$2^4 \times 3^4 \times 5^3 = 2^2 \times 2^2 \times 3^2 \times 3^2 \times 5^3$$

$$2^2 \times 3^6 \times 5^5 \times 7^2 = 2^2 \times 3^2 \times 3^2 \times 3^2 \times 5^5 \times 7^2$$

$$\text{LCM} = 2^4 \times 3^6 \times 5^5 \times 7^2$$

13. What is the LCM of $\frac{6}{25}, \frac{4}{45}$ and $\frac{3}{35}$?

(a) $\frac{1}{5}$ (b) $\frac{12}{5}$ (c) $\frac{210}{12}$ (d) $\frac{12}{210}$

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (b) : Given fractions = $\frac{6}{25}, \frac{4}{45}, \frac{3}{35}$

$$\text{L.C.M. of fractions} = \frac{\text{L.C.M. of Numerator}}{\text{H.C.F. of Denominator}}$$

L.C.M. of Numerator \Rightarrow

$$6 = 2 \times 3$$

$$4 = 2 \times 2$$

$$3 = 1 \times 3$$

L.C.M. = $2 \times 2 \times 3 = 12$

H.C.F. of Denominator \Rightarrow

$$25 = 5 \times 5$$

$$45 = 5 \times 3 \times 3$$

$$35 = 5 \times 7$$

$$\text{HCF} = 5$$

Hence, L.C.M. of given fraction = $\frac{12}{5}$

14. Find the LCM of 24, 96 and 36.

(a) 576 (b) 216 (c) 288 (d) 144

RRB NTPC 17.01.2017 Shift-2

Ans : (c) Finding the LCM by using common division method,

2	24,	96,	36
2	12,	48,	18
2	6,	24,	9
2	3,	12,	9
2	3,	6,	9
3	3,	3,	9
3	1,	1,	3
	1,	1,	1

The required LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 288$

15. Find the LCM of 17/31, 34/62 and 48/93.

(a) 816/31 (b) 802/31
(c) 912/31 (d) 804/31

RRB NTPC 04.04.2016 Shift : 3

Ans : (a) The LCM of given fractions,

LCM of 17, 34 and 48,

$$17 = 1 \times 17$$

$$34 = 1 \times 2 \times 17$$

$$48 = 1 \times 2 \times 2 \times 2 \times 3$$

$$\text{LCM} = 1 \times 2 \times 2 \times 2 \times 3 \times 17 = 816$$

HCF of 31, 62 and 93,

$$31 = 1 \times 31$$

$$62 = 1 \times 2 \times 31$$

$$93 = 1 \times 3 \times 31$$

$$\text{HCF} = 1 \times 31 = 31$$

So, the required LCM = $\frac{\text{The LCM of numerator}}{\text{The HCF of denominator}}$

$$= \frac{816}{31}$$

Type - 2

Remainder Problems Related to LCM

16. The least number which on being divided by 2, 3, 4, 5 and 6 leaves a remainder of 1 but no remainder when divided by 7 is :

(a) 322 (b) 301 (c) 308 (d) 315

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (b) : The smallest number = LCM of 2, 3, 4, 5 and 6 = 60,

According to the question-

$$(60x + 1), \text{ is divisible by } 7.$$

$$\therefore \text{Taking } x = 5$$

$$\text{Required number} = 60 \times 5 + 1 = 301$$

17. Find the least number that when divided by 9, 8, 10 and 12 leaves a remainder 3 in each case.

(a) 365 (b) 361 (c) 363 (d) 367

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (c) : L.C.M. of 9, 8, 10 and 12 = 360
According to question, in each case the remainder is 3
Number = 360 + 3
So, number will be 363.

- 18. Find the second term in a sequence of numbers that leaves that remainders 1, 2 and 7 when divided by 2, 3 and 8 respectively.**

(a) 37 (b) 38 (c) 48 (d) 47

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (d) : LCM of number 2, 3 and 8 = 24
Required number = 24K-1
($\because 2-1=1, 3-2=1, 8-7=1$)
(On putting K = 2)
= 24 × 2 - 1 = 47

- 19. The least multiple of 7 which when divided by 8, 12 and 16 leaves 3 as remainder in each case**

(a) 70 (b) 48 (c) 147 (d) 56

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (c) : Number = (L.C.M of 8, 12 and 16) K + 3
= 48 K + 3 Where K = 1, 2, 3, 4.....
Taking K = 3 for the least multiple of 7.
Least multiple = 48 × 3 + 3
= 147

- 20. Find the sum of the numbers between 400 and 500 such that when 8, 12, and 16 divide them, it leaves 5 as remainder in each case.**

(a) 932 (b) 912 (c) 942 (d) 922

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (d) : LCM of 8, 12 and 16 = 48
Number between 400 and 500 which are divisible by 48
= 432 + 480
Required number = (432 + 5), (480 + 5) = 437, 485
Sum of Number = 437 + 485 = 922

- 21. Find the least number which when divided by 8, 12 and 16, leaves 3 as the remainder in each case but when divided by 7 leaves no remainder**

(a) 266 (b) 147 (c) 149 (d) 248

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (b) : Number = (LCM of 8, 12, and 16) k + 3
Number = 48k + 3
k = 3 putting
= 48 × 3 + 3
= 144 + 3 = 147
Hence, number '147' is divisible by 7.

- 22. What will be the least multiple of 23 which when divided by 18, 21 and 24 leaves the remainder 7, 10 and 13 respectively.**

(a) 3113 (b) 3013
(c) 3103 (d) 3131

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : LCM of 18, 21, 24 = 504

$$\left\{ \begin{array}{l} \because 18-7=11 \\ 21-10=11 \\ 24-13=11 \end{array} \right\}$$

Required Number = 504 × n - 11

Let, on putting n = 6

$$= 504 \times 6 - 11$$

Required Number = 3013

- 23. Find the sum of the numbers between 400 and 600 such that when they are divided by 6, 12 and 16, there will be no remainder.**

(a) 2610 (b) 2016
(c) 2620 (d) 2026

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (b) : LCM of Number 6, 12, and 16 = 48

$$\text{Required numbers} = 48 \times 9 = 432$$

$$= 48 \times 10 = 480$$

$$= 48 \times 11 = 528$$

$$= 48 \times 12 = 576$$

$$\text{Total Required number} = 2016$$

- 24. Find the largest four-digit number which when divided by 7, 9 and 11 leaves a remainder of 5 in each case.**

(a) 9707 (b) 9467
(c) 9236 (d) 9763

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (a) : From question,

$$\text{L.C.M. of 7, 9 and 11} = 693$$

$$\text{The largest four-digit number} = 9999$$

$$693 \overline{) 9999} \begin{array}{r} 14 \\ 693 \end{array}$$

$$3069$$

$$2772$$

$$297$$

$$\text{Required Number} = 9999 - 297 + 5 = 9707$$

- 25. Find the least positive number; which when divided by 5, 6, 8, 9 and 12 gives 1 as a remainder in each case and is completely divisible by 13.**

(a) 3640 (b) 3614
(c) 3601 (d) 3627

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (c) : L.C.M of 5, 6, 8, 9 and 12 is = 360

$$\therefore \text{Required number} = 360 K + 1$$

On putting K = 10, Number is completely divisible by 13.

$$\begin{aligned} \therefore \text{Required number} &= 360 \times 10 + 1 \\ &= 3600 + 1 \\ &= 3601 \end{aligned}$$

- 26. Find the least number which when divided by 5 leaves no remainder, when divided by 4 leaves a remainder of 1, but when divided by 6 or 7, leaves a remainder of 5.**

(a) 450 (b) 430
(c) 425 (d) 400

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (c) : LCM of (5, 4, 6, 7) = 420 + 5

$$= 425$$

$$\frac{425}{5} \equiv 0 \text{ (remainder)}, \frac{425}{4} \equiv 1 \text{ (remainder)},$$

$$\frac{425}{6} \equiv 5 \text{ (remainder)}, \frac{425}{7} \equiv 5 \text{ (remainder)},$$

27. Find the smallest 4-digit number which when divided by 2, 3 and 5 leaves a remainder of 1 in each case?
 (a) 1091 (b) 1021
 (c) 1001 (d) 1041

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (b) : LCM of 2, 3 and 5 = 30
 The smallest 4-digit number = 1000

$$\begin{array}{r} 30 \overline{)1000(33} \\ \underline{90} \\ 100 \\ \underline{90} \\ 10 \end{array}$$

Required number = $1000 + (30 - 10) + 1$
 $1000 + 20 + 1$
 $= 1021$

Type - 3 Simple Problems Related to HCF

28. Ravi has 1530 eggs with him while Vinita has 2380 eggs with her that needs to be placed in cartons. What is the maximum number of eggs that each carton should hold so that both Ravi as well as Vinita finds such cartons acceptable to use, leaving no empty space, nor having any egg unpacked?
 (a) 170 (b) 255 (c) 340 (d) 85

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (a) : HCF of 1530 and 2380
 $1530 = 2 \times 5 \times 17 \times 3 \times 3$
 $2380 = 2 \times 5 \times 17 \times 2 \times 7$
 $\text{HCF} = 2 \times 5 \times 17 = 170$

Hence, Maximum number of eggs = 170

29. What is the HCF of 144, 360 and 504 ?
 (a) 24 (b) 36 (c) 72 (d) 18

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (c) : HCF of 144, 360 and 504
 $144 = 2 \times 2 \times 2 \times 3 \times 3$
 $360 = 2 \times 2 \times 2 \times 3 \times 3 \times 5$
 $504 = 2 \times 2 \times 2 \times 3 \times 3 \times 7$
 $\text{HCF} = 2 \times 2 \times 2 \times 3 \times 3$

Hence required HCF = 72

30. Kiran has 24 white beads and Resham has 18 black beads. They want to arrange the beads in such a way that each row contains equal number of beads and each row must contain either only black beads or only white beads. What is the greatest number of beads that can be arranged in a row?
 (a) 8 (b) 3 (c) 6 (d) 12

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (c) : Kiran has 24 white beads and Resham has 18 black beads.
 $24 = 2 \times 2 \times 2 \times 3$
 $18 = 2 \times 3 \times 3$
 $\text{HCF} = 2 \times 3 = 6$

So maximum number of beads is 6 that can be arranged in a row.

31. If $x = 2^3 \times 3^2 \times 5 \times 7^3$, $y = 2^2 \times 3^3 \times 5^2 \times 7^2$, and $z = 2^4 \times 3 \times 5^3 \times 7$. Then the HCF of x, y and z is:
 (a) 1260 (b) 840
 (c) 420 (d) 630

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,

$$\begin{aligned} x &= 2^3 \times 3^2 \times 5 \times 7^3 \\ y &= 2^2 \times 3^3 \times 5^2 \times 7^2 \\ z &= 2^4 \times 3 \times 5^3 \times 7 \end{aligned}$$

$$\begin{aligned} \text{HCF of } x, y \text{ and } z &= 2^2 \times 3 \times 5 \times 7 \\ &= 4 \times 3 \times 5 \times 7 \\ &= 420 \end{aligned}$$

32. The HCF of two different numbers is always 1, when:
 (a) Both numbers are prime numbers
 (b) Both numbers are even numbers
 (c) Both numbers are odd numbers
 (d) One number is odd and the other number is even

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : The HCF of two different numbers is always 1 when both numbers are prime numbers.

33. If $P = a \times m \times r$ and $Q = b \times m \times 2 \times r$, where a, b, m, r are odd prime numbers, then the HCF of P and Q is:
 (a) a r (b) b r
 (c) m r (d) 2 r

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$\begin{aligned} P &= a \times m \times r \\ Q &= b \times m \times 2 \times r \end{aligned}$$

\therefore a, b, m, r are odd prime numbers
 \therefore HCF of P and Q = $m \times r$

34. Find the HCF of $\frac{2}{9}, \frac{16}{81}, \frac{32}{117}$ and $\frac{54}{189}$
 (a) $\frac{4}{6459}$ (b) $\frac{4}{1899}$
 (c) $\frac{2}{7371}$ (d) $\frac{8}{8483}$

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$\begin{aligned} \text{HCF of } \frac{2}{9}, \frac{16}{81}, \frac{32}{117}, \frac{54}{189} &= \frac{2 \times 1}{9}, \frac{2 \times 8}{9 \times 9}, \frac{2 \times 16}{13 \times 9}, \frac{2 \times 27}{9 \times 21} \\ \text{HCF of fraction} &= \frac{\text{HCF of numerator}}{\text{LCM of denominator}} \\ &= \frac{2}{27 \times 13 \times 21} = \frac{2}{7371} \end{aligned}$$

35. What is the HCF of n and n + 1 where n is a natural number?
 (a) 3 (b) 2
 (c) 0 (d) 1

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : HCF of n and n + 1 = 1

Where (n = 1..... ∞)

Hence, the HCF of two consecutive natural number is always 1.

36. Find the H.C.F. of $\frac{2}{3}, \frac{4}{9}, \frac{8}{15}$ and $\frac{10}{21}$?

- (a) $\frac{315}{4}$ (b) $\frac{4}{315}$ (c) $\frac{315}{2}$ (d) $\frac{2}{315}$

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (d) :

$$\therefore \text{HCF of fractions} = \frac{\text{H.C.F of numerators}}{\text{L.C.M of denominators}}$$

$$\frac{2}{3}, \frac{4}{9}, \frac{8}{15} \text{ and } \frac{10}{21} \text{ H.C.F.} = \frac{\text{H.C.F of 2, 4, 8 and 10}}{\text{L.C.M of 3, 9, 15 and 21}}$$

$$= \frac{2}{315}$$

37. 7 orange trees, 28 apple trees and 42 mango trees have to be planted in rows such that each row contains the same number of trees of one variety only. Minimum number of row in which the trees may be plant is
- (a) 14 (b) 12 (c) 11 (d) 5

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (c) : HCF of 7, 28 and 42 = 7

According to the question, minimum number of rows

$$= \frac{7}{7} + \frac{28}{7} + \frac{42}{7} = 1 + 4 + 6 = 11 \text{ rows}$$

38. Three containers contain 72 litres, 90 litres and 144 litres of milk respectively. What should be the biggest 'measuring -can', which can measure all the different quantities exactly (Without a remainder)?
- (a) 17 litres (b) 18 litres
(c) 11 litres (d) 13 litres

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (b) : Capacity of the largest 'Measuring Can' = HCF of 72, 90 and 144 litres.

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$90 = 2 \times 3 \times 3 \times 5$$

$$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$\text{HCF} = 18$$

Hence, the capacity of the largest 'Measuring Can' is 18 litres.

39. Three pieces of aluminium rod of different length, 44 cm, 22 cm and 55 cm respectively, are given to a boy. He has to cut them into rods of same length such that no aluminium waste is left. The maximum length (in cm) of such rod will be:
- (a) 11 cm (b) 22 cm (c) 5.5 cm (d) 16.5 cm

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (a) : HCF of 44 cm, 22 cm and 55 cm = 11 cm.

40. Find the greatest possible length that can be used to measure exactly the lengths $3\frac{1}{2}$ m and

$$8\frac{3}{4} \text{ m.}$$

- (a) $\frac{11}{4}$ m (b) $\frac{7}{4}$ m (c) $\frac{3}{4}$ m (d) $\frac{9}{4}$ m

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\text{HCF of } 3\frac{1}{2} \text{ and } 8\frac{3}{4} = \frac{\text{HCF of numerator}}{\text{LCM of denominator}}$$

$$\text{HCF of } \frac{7}{2} \text{ and } \frac{35}{4} = \frac{\text{HCF of 7, 35}}{\text{LCM of 2, 4}} = \frac{7}{4}$$

$$\text{Hence, greatest possible length} = \frac{7}{4} \text{ m}$$

41. A daily wage labourer was engaged for a certain number of days for ₹5850, but being absent on some of those days he was paid only ₹5200. What was his maximum possible daily wage?

- (a) ₹600 (b) ₹650 (c) ₹700 (d) ₹750

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (b) : His maximum possible daily wage = HCF of 5850 and 5200 = ₹650

42. Find the greatest possible length that can be used to measure exactly the lengths 7 m, 3 m 85cm and 12 m 95 cm.

- (a) 35 cm (b) 65 cm (c) 45 cm (d) 85 cm

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

$$7 \text{ m} \rightarrow 700 \text{ cm}$$

$$3 \text{ m } 85 \text{ cm} \rightarrow 385 \text{ cm}$$

$$12 \text{ m } 95 \text{ cm} \rightarrow 1295 \text{ cm}$$

$$\therefore \text{HCF of 700, 385 and 1295} = 35 \text{ cm}$$

(Greatest possible length)

43. The sum of two numbers is 288 and their HCF is 16. How many pairs of such numbers can be formed?

- (a) 2 (b) 5 (c) 4 (d) 3

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let number is 16x and 16 y

According to the question,

$$16(x + y) = 288$$

$$x + y = 18$$

$$1 + 17 = 18$$

$$5 + 13 = 18$$

$$7 + 11 = 18$$

Hence 3 pairs can be formed.

44. What is the HCF of 81, 91, 101, and 111?

- (a) 3 (b) 13 (c) 1 (d) 7

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (c) : HCF of 81, 91, 101 and 111 -

$$81 = 3 \times 3 \times 3 \times 3$$

$$91 = 7 \times 13$$

$$101 = 101$$

$$111 = 3 \times 37$$

Hence HCF = 1

45. A shopkeeper has 50 litres of oil in one can and 35 litres of oil in another can. The maximum capacity of the container that can measure the oil of either can exact number of times is?

- (a) 35 litres (b) 5 litres
(c) 10 litres (d) 15 litres

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (b) : The maximum capacity of container which can measure the oil of each container in whole number = H.C.F of numbers
HCF of 35 & 50 = 5

46. If the HCF of 51 and 85 is expressed in the form of $51m - 85$, then the value of m will be:

- (a) 3 (b) 1
(c) 5 (d) 2

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (d) : HCF of 51 and 85

$$51 = 3 \times 17$$

$$85 = 5 \times 17$$

$$\text{HCF} = 17$$

According to the question,

$$17 = 51m - 85$$

$$17 + 85 = 51m$$

$$102 = 51m$$

$$m = 2$$

47. Find the HCF of $(3^{45} - 1)$ and $(3^{35} - 1)$

- (a) 80 (b) 242
(c) 81 (d) 728

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given,

$$(3^{45} - 1) = (3^{9 \times 5} - 1) = \{(3^5)^9 - 1\}$$

$$\text{And } (3^{35} - 1) = 3^{7 \times 5} - 1 = \{(3^5)^7 - 1\}$$

Hence, common factor of $\{(3^5)^9 - 1\}$ and $\{(3^5)^7 - 1\}$

$$= 3^5 - 1$$

$$= 243 - 1$$

$$= 242$$

So, HCF of $(3^{45} - 1)$ and $(3^{35} - 1) = 242$

48. The HCF of two even numbers should be at least _____.

- (a) 0 (b) 4 (c) 2 (d) 1

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : The highest common factor of two even numbers must be atleast 2. Because all even numbers are always divisible by 2.

49. HCF of $2^4 \times 3^4 \times 5^3 \times 7^2$ and $2^2 \times 3^6 \times 5^5$ is:

- (a) $2^2 \times 3^4 \times 5^3$ (b) $2^3 \times 3^5 \times 5^4 \times 7$
(c) $2^6 \times 3^{10} \times 5^8 \times 7^2$ (d) $2^2 \times 3^2 \times 5^3 \times 7^2$

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : On finding the HCF of

$$(2^4 \times 3^4 \times 5^3 \times 7^2) \text{ and } (2^2 \times 3^6 \times 5^5)$$

$$\text{HCF} = 2^2 \times 3^4 \times 5^3$$

50. Sheeba has 24 chocolates, 36 biscuits and 60 ice creams to distribute to her classmates. She wants each of her classmates to get the same number of each thing. What is the maximum number of classmates in which she can distribute completely without saving a single thing?

- (a) 6 (b) 18 (c) 12 (d) 15

RRB NTPC 29.04.2016 Shift : 1

Ans : (c) According to the question,

The number of chocolates, biscuits and ice creams is 24, 36 and 60 respectively.

So, the maximum number of classmates = HCF of 24, 36 and 60

$$24 = 2 \times 2 \times 2 \times 3$$

$$36 = 2 \times 2 \times 3 \times 3$$

$$60 = 2 \times 2 \times 3 \times 5$$

$$\text{HCF} = 2 \times 2 \times 3 = 12$$

51. What is the HCF of 2189 and 2587?

- (a) 3 (b) 197 (c) 199 (d) 198

RRB NTPC 30.04.2016 Shift : 3

Ans : (c) On finding the HCF by division method,

$$\begin{array}{r} 2189 \overline{) 2587} \quad (1 \\ \underline{2189} \\ 398 \quad (5 \\ \underline{1990} \\ 199 \quad (2 \\ \underline{398} \\ 398 \\ \underline{398} \\ 0 \end{array}$$

So, the required HCF is 199.

52. Find the greatest length which can be used to measure exactly three cloth pieces of length 1.26 m, 1.98 m and 1.62 m respectively.

- (a) 12 cm (b) 14 cm (c) 16 cm (d) 18 cm

RRB NTPC 31.03.2016 Shift : 2

Ans : (d) The required length = HCF of 126cm, 198cm and 162 cm.

$$\begin{array}{r} 126 \overline{) 198} \quad (1 \\ \underline{126} \\ 72 \quad (1 \\ \underline{72} \\ 0 \end{array} \quad \begin{array}{r} 18 \overline{) 162} \quad (9 \\ \underline{162} \\ 0 \end{array}$$

So, the HCF = 18cm.

Hence, the greatest length = 18cm

53. 50 pens, 80 pencils and 65 scales were distributed among some students and found that five out of each item were not distributed. Find the number of students.

- (a) 5 (b) 20 (c) 15 (d) 10

RRB NTPC 31.03.2016 Shift : 3

Ans : (c) According to the question,

$$50 - 5 = 45$$

$$80 - 5 = 75$$

$$65 - 5 = 60$$

So, the required number of students = HCF of 45, 75 and 60.

$$45 = 3 \times 3 \times 5$$

$$75 = 3 \times 5 \times 5$$

$$60 = 2 \times 2 \times 3 \times 5$$

So, HCF = $3 \times 5 = 15$

54. You have 20 big and 16 small diaries and want to make gift packs containing both in each pack. What is the maximum number of gift packs you can make without any left over?
(a) 5 (b) 4 (c) 3 (d) 2

RRB NTPC 29.03.2016 Shift : 3

Ans : (b) The maximum number of gift packs = HCF of 20 and 16.

$$\begin{array}{r} 16 \overline{)20} (1 \\ \underline{16} \\ 4 \overline{)16} (4 \\ \underline{16} \\ \times \times \end{array}$$

So, HCF = 4,
So, 4 maximum gift packs can be made.

55. What is the highest common factor of 360 and 450?
(a) 90 (b) 45 (c) 10 (d) 9

RRB NTPC 29.03.2016 Shift : 3

Ans : (a) So, on finding the HCF by division method,

$$\begin{array}{r} 360 \overline{)450} (1 \\ \underline{360} \\ 90 \overline{)360} (4 \\ \underline{360} \\ \times \times \times \end{array}$$

So, the HCF is 90.

Type - 4 Remainder Problems Related to HCF

56. The largest number which divides 55, 72 and 123 leaving the remainders 3, 7 and 6 respectively is:

- (a) 13 (b) 66
(c) 26 (d) 117

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$55 - 3 = 52$$

$$72 - 7 = 65$$

$$123 - 6 = 117$$

$$\text{HCF of } 52, 65 \text{ and } 117 = 13$$

Hence the required largest number = 13

57. The greatest number that divides 155 and 307 leaving remainders 5 and 7, respectively is:

- (a) 15 (b) 25
(c) 150 (d) 30

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$155 - 5 = 150$$

$$307 - 7 = 300$$

Hence required number = HCF of 150 and 300
= 150

58. The greatest number that will divide 155, 260, 315 and leave the remainders 5, 10 and 15 respectively is:

- (a) 75 (b) 25
(c) 10 (d) 50

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (d) : Required number = HCF of $(155 - 5)$, $(260 - 10)$ and $(315 - 15)$
= HCF of 150, 250, and 300 = 50

59. What is the largest number that 2270, 3739 and 6677 must be divided by to obtain the same remainder in each case?

- (a) 1489 (b) 1459 (c) 1479 (d) 1469

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (d) : First we subtract the smaller number from the larger number,

Then the number obtained is:-

$$3739 - 2270 = 1469$$

$$6677 - 2270 = 4407$$

$$6677 - 3739 = 2938$$

HCF of 1469, 4407 and 2938 = 1469

Hence, Required number = 1469

60. Find the largest number which, when divides 1250 and 1615, gives remainder 4 and 5 respectively.

- (a) 13 (b) 14 (c) 16 (d) 18

RRB NTPC 28.04.2016 Shift : 1

Ans : (b) $1250 - 4 = 1246$

$$1615 - 5 = 1610$$

HCF of 1246 and 1610 = 14

$$\begin{array}{r} 1246 \overline{)1610} (1 \\ \underline{1246} \\ 364 \overline{)1246} (3 \\ \underline{1092} \\ 154 \overline{)364} (2 \\ \underline{308} \\ 56 \overline{)154} (2 \\ \underline{112} \\ 42 \overline{)56} (1 \\ \underline{42} \\ 14 \overline{)42} (3 \\ \underline{42} \\ \times \times \end{array}$$

Hence the required number is = 14

61. Find such greatest number which gives same remainders in each case when dividing 270, 675 and 1215.

- (a) 45 (b) 135 (c) 270 (d) 75

RRB NTPC 19.04.2016 Shift : 3

Ans : (b) According to the question,

$$675 - 270 = 405 = 3 \times 3 \times 3 \times 3 \times 5$$

$$1215 - 675 = 540 = 2 \times 2 \times 3 \times 3 \times 3 \times 5$$

$$1215 - 270 = 945 = 3 \times 3 \times 3 \times 5 \times 7$$

$$\text{HCF} = 3 \times 3 \times 3 \times 5 = 135$$

So, the required number is 135.

62. If P is the largest number which, when divides 60, 150 and 285, gives the same remainder in each case, then find the sum of digits of p.

- (a) 7 (b) 5 (c) 4 (d) 9

RRB NTPC 19.04.2016 Shift : 3

Ans. (d) The required number = The HCF of (150 – 60), (285 – 150) and (285 – 60)

$$90 = 2 \times 3 \times 3 \times 5$$

$$135 = 3 \times 3 \times 3 \times 5$$

$$225 = 3 \times 3 \times 5 \times 5$$

$$\text{HCF} = 3 \times 3 \times 5 = 45$$

So, the required sum = 4 + 5 = 9

Type - 5 Combined Problems of LCM and HCF

63. The ratio of the two numbers is 3 : 4 and their LCM is 480. Find their HCF.

- (a) 40 (b) 160 (c) 30 (d) 120

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (a) : Given,

Ratio of two numbers = 3 : 4

$$\text{LCM} = 3 \times 4 \times x$$

$$\text{Then } 3 \times 4 \times x = 480$$

$$12x = 480$$

$$x = 40$$

Hence, the HCF of 3x and 4x HCF are 40.

64. If the product of two co-primes is 104, then their LCM is?

- (a) can't be determined
(b) is 104
(c) is 1
(d) is equal to their HCF

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (b) : Factor of 104, we have

$$104 = 13 \times 8$$

HCF of co-prime numbers is always 1.

Now,

$$\text{HCF} \times \text{LCM} = \text{Product of two numbers.}$$

$$1 \times \text{LCM} = 104$$

$$\text{LCM} = 104$$

65. If LCM and HCF of two numbers are 70 and 7 respectively and if one number is 35, then what will be the second number?

- (a) 40 (b) 49 (c) 25 (d) 14

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given, LCM = 70

$$\text{HCF} = 7$$

From formula:- $\text{LCM} \times \text{HCF} = \text{First number} \times \text{Second number}$

If second number is x then

$$70 \times 7 = 35 \times x$$

$$x = 14$$

∴ Second number will be 14.

66. The HCF of two numbers is 6 and their LCM is 84 if one of these numbers is 42. Then the second number is:

- (a) 40 (b) 48 (c) 12 (d) 30

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (c) : $\text{L.C.M} \times \text{H.C.F.} = \text{First number} \times \text{Second number}$

$$84 \times 6 = 42 \times \text{Second number}$$

$$\text{Second number} = \frac{84 \times 6}{42} = 12$$

67. If the LCM of a and b is c, then their HCF is:

- (a) $\frac{ab}{b}$ (b) $\frac{bc}{a}$ (c) $\frac{c}{ab}$ (d) $\frac{ab}{c}$

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (d) : $\text{LCM} \times \text{HCF} = \text{First number} \times \text{second number}$
 $c \times \text{HCF} = a \times b$

$$\text{HCF} = \frac{ab}{c}$$

68. If the HCF of two numbers is 2 and their product is 120. Find the LCM of the number.

- (a) 120 (b) 90
(c) 30 (d) 60

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (d) : Product of both numbers = HCF × LCM

$$120 = 2 \times \text{LCM}$$

$$\text{LCM} = 60$$

69. The HCF and LCM of 36 and N are 9 and 180 respectively. Then find the value of N ?

- (a) 65 (b) 63
(c) 45 (d) 90

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (c) : From Formula,

$$\text{Product of both numbers} = \text{LCM} \times \text{HCF}$$

$$36 \times N = 9 \times 180$$

$$N = 45$$

70. If the LCM of $20x^3y^2$ and $10x^4y^4$ is $20x^4y^4$ find the HCF.

- (a) $10x^2y^2$ (b) $20x^3y^2$
(c) $10x^3y^2$ (d) $20x^2y^2$

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (c) :

$$\text{First Number} \times \text{Second Number} = \text{HCF} \times \text{LCM}$$

$$\text{HCF} = \frac{20x^3y^2 \times 10x^4y^4}{20x^4y^4}$$

$$= 10x^3y^2$$

71. The product of the LCM and HCF of two positive numbers is 28 and their difference is 3. The numbers are

- (a) 3 and 5 (b) 7 and 5
(c) 4 and 7 (d) 5 and 6

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (c) : Difference between number = 3

Then numbers be a and a+3.

We know that,

Product of two numbers = Product of their LCM and HCF

$$28 = a(a + 3)$$

$$a^2 + 3a - 28 = 0$$

$$a^2 + 7a - 4a - 28 = 0$$

$$a(a + 7) - 4(a + 7) = 0$$

$$(a + 7)(a - 4) = 0$$

$$\Rightarrow a = -7, 4$$

$$a = 4 \text{ (on taking positive value)}$$

$$\text{Now, } a = 4 \text{ and } a + 3 = 7$$

Hence, the numbers are 4 and 7.

72. The HCF and LCM of two numbers are 75 and 450 respectively. If the first number is divided by 3, the quotient is 75. The second number is
(a) 75 (b) 225 (c) 450 (d) 150

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the first number is x
According to the question,

$$\frac{x}{3} = 75$$

$$x = 225$$

We know that,

$$\text{First number} \times \text{Second number} = \text{LCM} \times \text{HCF}$$

$$225 \times \text{Second number} = 450 \times 75$$

$$\text{Second number} = \frac{450 \times 75}{225} = 150$$

73. The HCF and LCM of two numbers are 60 and 420, respectively. If the first number is divided by 2, then the quotient is 60. The second number is:
(a) 150 (b) 190 (c) 170 (d) 210

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : HCF = 60, LCM = 420

Let the first number be 'a'.

From the formula, Dividend = divisor \times quotient + remainder

As per question, $a = 2 \times 60 + \text{Zero}$
 $a = 120$

So the first number $a = 120$

$$\text{LCM} \times \text{HCF} = \text{First number} \times \text{Second number}$$

$$420 \times 60 = 120 \times \text{Second number}$$

$$\text{Second number} = \frac{420 \times 60}{120} = 210$$

74. The LCM of two positive integers is thrice the larger number. The difference of the smaller number and the HCF of the two numbers is 6. The smaller number is :
(a) 9 (b) 11 (c) 5 (d) 7

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let larger number = aH

Smaller number = bH

$$\text{L.C.M.} = 3aH$$

$$\text{H.C.F. of } aH \text{ and } bH = H$$

$$\text{L.C. M of } aH \text{ and } bH = abH$$

$$\therefore abH = 3aH$$

$$b = 3$$

$$\therefore bH - H = 6 \quad (\text{On putting the value of } b)$$

$$3H - H = 6$$

$$2H = 6$$

$$H = 3$$

$$\text{Smaller number} = bH = 3 \times 3 = 9$$

75. HCF and LCM of two numbers are 5 and 210 respectively. If the numbers are between 25 and 40, the sum of the numbers will be :
(a) 60 (b) 65
(c) 50 (d) 55

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let, the number be 5a and 5b respectively.
Where a and b are co-prime number.

$$\text{First number} \times \text{Second number} = \text{L.C.M} \times \text{H.C.F}$$

$$5a \times 5b = 5 \times 210$$

$$ab = 42$$

The possible value of a and b according to the questions
Hence,

$$\text{The number are } 5a = 5 \times 6 = 30$$

$$\text{And } 5b = 5 \times 7 = 35$$

$$\text{Sum of numbers} = 35 + 30 = 65$$

76. The LCM of three numbers is 4752 and the HCF is 6. If two numbers are 48 and 66, find the third number.

(a) 54 (b) 56 (c) 58 (d) 52

RRB NTPC 29.04.2016 Shift : 3

Ans. (a) : According to the question,

\therefore HCF of all three numbers is 6.

The number in options which is divisible by 6 will be the third number.

So, from options, only 54 is divisible by 6.

Hence the third number is 54.

77. Two natural number are in the ratio of 6:5 and the product of their LCM and HCF is 6750. What is the sum of the numbers ?
(a) 180 (b) 165 (c) 160 (d) 145

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (b) : Let the two numbers be 6x and 5x.

and product of LCM and HCF = 6,750

$$\therefore 1^{\text{st}} \text{ number} \times 2^{\text{nd}} \text{ number} = \text{LCM} \times \text{HCF}$$

$$6x \times 5x = 6,750$$

$$30x^2 = 6,750$$

$$x^2 = \frac{6,750}{30}$$

$$x^2 = 225$$

$$x = 15$$

$$1^{\text{st}} \text{ number} = 6x$$

$$= 6 \times 15 = 90,$$

$$2^{\text{nd}} \text{ number} = 5x$$

$$= 5 \times 15$$

$$= 75$$

$$\text{Hence Sum of both numbers} = 90 + 75 = 165$$

78. The LCM of two numbers is 20 times their HCF, and the sum of the LCM and the HCF is 504. If the difference of the numbers is 24, then find the sum of the numbers.

(a) 210 (b) 216 (c) 225 (d) 180

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : According to the question,

$$L = 20H \text{ — (i)}$$

$$\text{and, } L + H = 504 \text{ — (ii)}$$

$$H(a - b) = 24 \text{ — (iii)}$$

$$\text{From equation (iii) } a - b = 1$$

$$20H + H = 504 \Rightarrow H = 24$$

$$\text{equation (iii) and } (a - b) = 1$$

$$\therefore L = Hab$$

$$\therefore Hab = 20H \text{ [from equation (i)]}$$

$$ab = 20$$

$$(a + b)^2 = (a - b)^2 + 4ab$$

$$= 1 + 80 = 81$$

$$\Rightarrow (a + b) = 9$$

$$\text{Hence, Sum of numbers} = H(a + b)$$

$$= 24 \times 9 = 216$$

79. The sum of two numbers is 72. Their HCF and LCM are 2 and 102, respectively. The sum of the reciprocals of the same two numbers is

- (a) $\frac{7}{19}$ (b) $\frac{6}{17}$
(c) $\frac{8}{19}$ (d) $\frac{5}{17}$

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (b) :

Let two number be A and B, LCM = 102, HCF = 2

According to the question, $A + B = 72$... (i)

And product of two numbers = HCF \times LCM

$$A \times B = 2 \times 102$$

$$A \times B = 204 \quad \dots (ii)$$

The sum of the reciprocals of the same two numbers is

$$\begin{aligned} &= \frac{1}{A} + \frac{1}{B} = \frac{A+B}{AB} \\ &= \frac{72}{204} = \frac{6}{17} \end{aligned}$$

80. The LCM of two numbers is 26 times their HCF. The sum of the HCF and LCM is 729. If one number is 81, find the other.

- (a) 231 (b) 234
(c) 233 (d) 232

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question-

Let- LCM = x

and HCF = y

$$x = 26y$$

$$x + y = 729$$

$$26y + y = 729$$

$$27y = 729$$

$$(y) = 27$$

$$\text{First number} \times \text{Second number} = \text{LCM} \times \text{HCF}$$

$$81 \times \text{Second number} = (26 \times 27) \times 27$$

$$\text{Hence, second number} = \frac{26 \times 27 \times 27}{81} = 234$$

81. The ratio of two numbers is 3 : 4 and their H.C.F is 4. Their L.C.M is:

- (a) 42 (b) 34
(c) 84 (d) 48

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (d) : Ratio of two numbers = 3 : 4

Let two number are 3x and 4x respectively

$$\text{L.C.M of } 3x, 4x = 12x$$

$$\text{H.C.F} = 4$$

$$\text{First Number} \times \text{Second Number} = \text{L.C.M} \times \text{H.C.F}$$

$$3x \times 4x = 12x \times 4$$

$$\boxed{x = 4}$$

$$\text{Hence, L.C.M of } 3x \text{ and } 4x = 12x$$

$$\begin{aligned} &= 12 \times 4 \\ &= 48 \end{aligned}$$

82. If the sum of two numbers is 84 and their HCF and LCM are 3 and 124 respectively, the sum of the reciprocals of the two numbers will be:

- (a) $\frac{11}{31}$ (b) $\frac{9}{31}$ (c) $\frac{8}{31}$ (d) $\frac{7}{31}$

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the first and second numbers are Ha and Hb respectively.

$$L = \text{Hab} \Rightarrow 124 = 3ab$$

$$ab = \frac{124}{3}$$

$$\text{And } H(a+b) = 84 \Rightarrow (a+b) = 28$$

$$\begin{aligned} \text{Then, } \frac{1}{Ha} + \frac{1}{Hb} &= \frac{Ha+Hb}{Ha \times Hb} \\ &= \frac{H(a+b)}{H^2ab} \\ &= \frac{(a+b)}{Hab} = \frac{28}{124} = \frac{7}{31} \end{aligned}$$

83. The HCF and LCM of two numbers are in the ratio of 1 : 30 and the difference between the HCF and LCM is 493. Find the product of LCM and HCF.

- (a) 8670 (b) 540 (c) 6064 (d) 4040

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let, HCF = x

$$\text{LCM} = 30x$$

According to the question,

$$\text{LCM} - \text{HCF} = 493$$

$$30x - x = 493$$

$$29x = 493$$

$$x = 17$$

$$\text{Hence, HCF} \times \text{LCM} = 30x \times x$$

$$= 30 \times 17 \times 17$$

$$= 8670$$

84. What is the product of the LCM and the HCF of 15 and 25?

- (a) 375 (b) 225 (c) 75 (d) 150

RRB NTPC 17.02.2021 (Shift-II) Stage I

Ans. (a) : LCM of 15 and 25

$$15 = 3 \times 5$$

$$25 = 5 \times 5$$

$$\text{LCM} = 75$$

$$\text{HCF} = 5$$

$$\text{Product} = \text{LCM} \times \text{HCF}$$

$$= 75 \times 5$$

$$= 375$$

85. What is the product of LCM and HCF of 18 and 42 ?

- (a) 756 (b) 736 (c) 746 (d) 766

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (a) : $18 = 2 \times 3 \times 3$

$$42 = 2 \times 3 \times 7$$

$$\text{HCF} = 2 \times 3 = 6$$

$$\text{LCM} = 2 \times 3 \times 3 \times 7 = 126$$

$$\text{Product of LCM and HCF}$$

$$= 6 \times 126$$

$$= 756$$

86. The sum and difference of the LCM and HCF of two numbers are 682 and 638 respectively. If the sum of the two numbers is 286, find the numbers.

- (a) 246 and 40 (b) 226 and 60
(c) 220 and 66 (d) 242 and 44

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (c) : LCM + HCF = 682(i)

LCM - HCF = 638(ii)

By adding eqⁿ (i) and (ii)

$$2 \text{ LCM} = 1320$$

$$\text{LCM} = 660$$

On putting the value of LCM in eqn (i)-

$$660 + \text{HCF} = 682$$

$$\text{HCF} = 22$$

According to the question-

$$\text{LCM} \times \text{HCF} = x \times y$$

$$660 \times 22 = (286 - y) \times y \quad (\text{Given: } x + y = 286)$$

$$660 \times 22 = 286y - y^2$$

$$y^2 - 286y + 14520 = 0$$

$$y^2 - (220 + 66)y + 14520 = 0$$

$$y^2 - 220y - 66y + 14250 = 0$$

$$y(y - 220) - 66(y - 220) = 0$$

$$(y - 220)(y - 66) = 0$$

So the numbers are 220 and 66.

87. The product of the LCM and the HCF of two positive numbers is 32 and the difference of the numbers is 4. The sum of the number is.

- (a) 12 (b) 14 (c) 16 (d) 10

RRB NTPC 17.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the number is A and B

$$\therefore \text{First number} \times \text{Second number} = \text{LCM} \times \text{HCF}$$

According to the question,

$$A \times B = 32$$

$$\text{And } A - B = 4$$

$$\text{Then } (A+B) = ?$$

$$(A+B)^2 = (A-B)^2 + 4AB$$

$$(A+B)^2 = 16 + 4 \times 32$$

$$(A+B)^2 = 16 + 128 = 144$$

$$(A+B) = 12$$

88. The HCF of two numbers is 19 and the other two factors of their LCM are 11 and 13. The larger number of the two numbers is:

- (a) 243 (b) 241 (c) 249 (d) 247

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the smaller and larger numbers is Ha and Hb

$$\text{HCF} = 19$$

$$\text{Then numbers- } Ha = 19 \times 11 = 209$$

$$Hb = 19 \times 13 = 247$$

$$\text{Hence larger number } (Hb) = 247$$

89. The LCM of two numbers is 91 times their HCF. The sum of the HCF and LCM is 2760. If one of the numbers is 210, Then find the second number.

- (a) 30 (b) 2730
(c) 390 (d) 420

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let HCF is x then LCM will be 91x.

According to question -

$$91x + x = 2760$$

$$92x = 2760$$

$$x = 30$$

$$\therefore \text{First number} \times \text{Second number} = \text{LCM} \times \text{HCF}$$

$$210 \times \text{Second number} = 91 \times 30 \times 30$$

$$\text{Second number} = 13 \times 30 = 390$$

90. The sum of two numbers is 60 and their HCF and LCM are 12 and 72 respectively. The sum of the reciprocal of the two numbers is:

- (a) $\frac{1}{5}$ (b) $\frac{5}{72}$
(c) $\frac{5}{6}$ (d) $\frac{5}{12}$

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : Let the numbers are a & b respectively.

According to the question,

$$a + b = 60 \quad \dots(i)$$

$$\text{L.C.M.} \times \text{H.C.F.} = \text{Product of both numbers a \& b.}$$

$$\frac{a+b}{ab} = \frac{60}{12 \times 72}$$

$$\frac{a}{ab} + \frac{b}{ab} = \frac{5}{72}$$

$$\frac{1}{b} + \frac{1}{a} = \frac{5}{72} \text{ or } \frac{1}{a} + \frac{1}{b} = \frac{5}{72}$$

91. If the product of two numbers is 4941 and their LCM is 81 then, what is their HCF?

- (a) 60 (b) 59
(c) 35 (d) 61

RRB NTPC 17.01.2017 Shift-3

Ans : (d) From formula,

$$\text{Product of two numbers} = \text{LCM} \times \text{HCF}$$

$$4941 = 81 \times \text{HCF}$$

$$\text{HCF} = \frac{4941}{81} = 61$$

92. The ratio of two number is 8:9 and their HCF is 6. Their LCM will be:

- (a) 432 (b) 54
(c) 48 (d) 423

RRB NTPC 17.01.2017 Shift-3

Ans : (a) According to the question,

$$\text{HCF of both numbers} = 6$$

And their ratio is 8:9,

$$\text{So, the First number} = 8 \times 6 = 48$$

$$\text{Second number} = 9 \times 6 = 54$$

$$\text{LCM} \times \text{HCF} = \text{First number} \times \text{Second number}$$

$$48 \times 54 = 6 \times \text{LCM}$$

$$\text{LCM} = \frac{48 \times 54}{6}$$

$$\text{LCM} = 432$$

Type - 6

Problems Related to Square Tiles

93. A rectangular courtyard is 18 m 72 cm long and 13 m 20 cm broad. It is to be paved with square tiles all of the same size. Find the least possible number of such tiles required.

(a) 4292 (b) 4290
(c) 4294 (d) 4295

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given that,

Length (l) = 18 m 72 cm = 1872 cm

Broad (b) = 13 m 20 cm = 1320 cm

For minimum number of tiles, we have to calculate HCF of 1872 and 1320.

$$1872 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 13$$

$$1320 = 2 \times 2 \times 2 \times 3 \times 5 \times 11$$

$$\therefore \text{HCF} = 2 \times 2 \times 2 \times 3 = 24 \text{ cm}$$

Therefore, the maximum size of the tile should be square tile of side 24 cm.

So, required of minimum tiles

$$= \frac{1872 \times 1320}{24 \times 24} = 78 \times 55 = 4290$$

94. Flooring of a room 12 m long and 8 m wide is to be designed by squares of maximum possible area. Find the number of square designs required.

(a) 6 (b) 4 (c) 5 (d) 8

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (a) : Side of one Square design = HCF of 12 and 8 = 4

$$\text{Required number} = \frac{\text{Area of floor of room}}{\text{Area of one square design}}$$

$$= \frac{12 \times 8}{4 \times 4} = 6$$

95. The floor of a hall measuring 16 meters in length and 12 meters in width is to be paved with square tiles. If the least number of tiles are to be used, then what is the length of each square tile?

(a) 4 meters (b) 12 meters
(c) 48 meters (d) 24 meters

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (a) : Length of floor = 16m

Breadth of floor = 12m

$$\therefore \text{HCF of 16 \& 12} = 4$$

Hence the length of each square tiles = 4 meter

Type - 7

Problems Based on Alarm/Bell/ Light etc

96. Five bells commence tolling together and toll at intervals of 3, 6, 12, 15 and 18 seconds respectively. They tolled at 9:58:45 hours then at which time they will again toll together?

(a) 10:02:45 (b) 10:01:45
(c) 10:01:15 (d) 10:00:15

RRB NTPC (Stage-2) 16/06/2022 (Shift-II)

Ans. (b) : LCM of 3, 6, 12, 15 and 18.

3	3, 6, 12, 15 18
2	1, 2, 4, 5, 6
2	1, 1, 2, 5, 3
3	1, 1, 1, 5, 3
5	1, 1, 1, 5, 1
	1, 1, 1, 1, 1

$$= 3 \times 2 \times 2 \times 3 \times 5$$

$$= 180 \text{ sec or 3 minutes}$$

According to the question,

The bells rings at 9 : 58 : 45

9:58:45

: 3 :

10:01:45 The bells rang together again

Hence, At 10:01:45 hours they will again toll together.

97. There are three consecutive road crossings at which traffic lights change after every 35 seconds, 42 seconds and 90 seconds, respectively. If the lights are set on simultaneously at 8:00, then after how much time will they change again simultaneously?

(a) 10 minutes 30 seconds
(b) 9 minutes 10 seconds
(c) 7 minutes 20 seconds
(d) 9 minutes 30 second

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (a) : L.C.M of 35, 42 and 90.

21	35, 42, 90
3	35, 21, 45
3	35, 7, 15
5	35, 7, 5
7	7, 7, 1
	1, 1, 1

$$= 2 \times 3 \times 3 \times 5 \times 7$$

$$= 630 \text{ Seconds}$$

$$= 10 \text{ minute } 30 \text{ seconds}$$

After 10 minutes 30 seconds light will again change simultaneously.

98. There are four table clocks. They ring every 10 min, 15 min, 20 min and 25 min respectively. If they all ring together at 10 am, then at what time will they ring together again?

(a) 10:00 a.m. (b) 3:00 p.m.
(c) 10:00 p.m. (d) 3:30 p.m.

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (b) :

L.C.M. of 10, 15, 20 and 25 = 300 min = 5 hours

Hence the table clock will again ring at 10:00 am + 5 hours simultaneously = 3 : 00 pm

99. A pendulum strikes 2 times in 3s and another pendulum strikes 5 times in 7s. If both pendulum start striking at the same time, how many simultaneous strikes will take place in 1 min?

(a) 2 (b) 4 (c) 5 (d) 3

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (a) : According to question:

Pendulum on strikes 1 time = Difference of $\frac{3}{2}$ seconds
 And other pendulum on strikes 1 time = Difference of $\frac{7}{5}$ seconds

If both Pendulum start striking at the same time, then they will strike together = LCM of $\frac{3}{2}$ and $\frac{7}{5}$ = Difference of 21 seconds

They strike together in 1 min (60 sec) = $\frac{60}{21} = \frac{20}{7} = 2\frac{6}{7} = 2$ times (take only whole number)

- 100. Three electronic bells are fixed in three adjoining temples. The priests of these temples decided to ring the bells at different times with the intervals of 2, 3 and 5 min. If the bells start tolling together for the first time at 8 : 00 : 00 in the morning, up to 9 : 00 : 00 in the morning they will toll together:**

- (a) 4 times after the starting time
 (b) 2 times after the starting time
 (c) 5 times after the starting time
 (d) 15 times after the starting time

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : L.C.M. of 2, 3, 5 = 30 minute
 Difference between 8 : 00 – 9.00 = 1 hour

Hence, bell will ring in 60 minute = $\frac{60}{30} = 2$ times

- 101. A, B and C begin together to move around a circular stadium and they complete their revolutions in 42s, 63s and 84s respectively. After how much time will they come together at the starting point?**

- (a) 152s (b) 252s (c) 452s (d) 256s

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (b) : Time taken by A, B and C to meet again at the starting point = LCM of 42, 63 and 84 = 252 seconds.

$$42 = 2 \times 3 \times 7$$

$$63 = 3 \times 3 \times 7$$

$$84 = 2 \times 2 \times 3 \times 7$$

$$\text{LCM} = 2 \times 2 \times 3 \times 3 \times 7 = 252s$$

- 102. Moving along circular path, Ansh takes 18 minutes to complete one round and Siddhi takes 12 minutes for the same. If they start from the same point and at the same time, then after what time they will meet again at the starting point?**

- (a) 1.5 minutes (b) 216 minutes
 (c) 36 minutes (d) 6 minutes

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : LCM of 18 minutes and 12 minutes = 36 minutes

If Ansh and Siddhi started from same point and same time then they will meet again at the same point after 36 minutes.

- 103. Three different traffic signals change lights every 72, 108 and 48 seconds respectively. If the lights change simultaneously at 9:30:00 am, then at what time will they change next simultaneously?**

- (a) 9:44:24 am (b) 9:37:12 am
 (c) 9:37:20 am (d) 9:36:12 am

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question, LCM of 72, 108 and 48

2	72, 108, 48
2	36, 54, 24
2	18, 27, 12
2	9, 27, 6
3	9, 27, 3
3	3, 9, 1
3	1, 3, 1
	1, 1, 1

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 432$$

If at 9:30 light change simultaneously and 432 seconds or 7 min. 12 second after they change simultaneously again.

Hence, Required time = 9:37:12 a.m.

- 104. Three bells ring at intervals of 15, 20 and 30 minutes respectively. If they ring together at 11:00 am, then when will they ring together again?**

- (a) 11.30 a.m. (b) 12 noon
 (c) 12.30 p.m (d) 1.00 p.m

RRB NTPC 28.03.2016 Shift : 1

Ans : (b) LCM of 15, 20 and 30 = 60

So, all the three bells ring together at the interval of 60 minutes = 1 hour.

So, the bells will ring together at 11:00 + 1:00 = 12:00 noon.

- 105. Four bells ring at intervals of 16, 24, 36 and 42 minutes respectively. If they were last ring together at 6:00 am, then after how many minutes will they ring together again?**

- (a) 842 minute (b) 964 minute
 (c) 886 minute (d) 1008 minute

RRB NTPC 18.01.2017 Shift : 2

Ans : (d) The bells will ring together again = LCM of 16, 24, 36 and 42.

2	16, 24, 36, 42
2	8, 12, 18, 21
2	4, 6, 9, 21
2	2, 3, 9, 21
3	1, 3, 9, 21
3	1, 1, 3, 7
7	1, 1, 1, 7
	1, 1, 1, 1

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 1008$$

Hence, after 1008 minutes they will ring together.

106. The traffic lights at four different road crossings change after every 15 sec, 18 sec, 27 sec and 30 sec respectively. If they all change simultaneously at 6:10:00 hours, then at what time will they again change simultaneously?
 (a) 6:14:30 hours (b) 6:40:00 hours
 (c) 6:14:00 hours (d) 10:40:00 hours

RRB NTPC 16.04.2016 Shift : 3

Ans. : (a)

Traffic lights will again change simultaneously
 = LCM of 15, 18, 27 and 30
 On finding the LCM by common division method,

2	15,	18,	27,	30
3	15,	9,	27,	15
3	5,	3,	9,	5
3	5,	1,	3,	5
5	5,	1,	1,	5
	1,	1,	1,	1

LCM = $2 \times 3 \times 3 \times 3 \times 5 = 270$ sec
 So, after 270 seconds = 4 min 30 sec,
 Hence the traffic lights will change simultaneously at
 6:10:00 + 00:04:30 = 6:14:30

107. Three clocks are designed to ring after every 1 hour, 2 hours and 3 hours respectively. If they ring together then after how many hours will they ring together?
 (a) 3 hours (b) 6 hours
 (c) 4 hours (d) 12 hours

RRB NTPC 29.04.2016 Shift : 2

Ans : (b) According to the question,
 The interval for ringing three clocks' together = LCM
 of 1 hour, 2 hours and 3 hours = 6
 So, they will ring together after 6 hours.

Type - 8 Divisibility Problems Based on LCM and HCF

108. Which of the following numbers is divisible by 7, 11 and 13?
 (a) 1005001 (b) 1003001
 (c) 1004001 (d) 1002001

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) : LCM of 7, 11 and 13 = $7 \times 11 \times 13$
 = 1001
 $\therefore (1001)^2 = 1002001$
 Hence, 1002001 divisible by 7, 11 and 13.

109. What is the largest number that will divide both 288 and 468 without leaving any remained?

(a) 18 (b) 72 (c) 36 (d) 39

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (c) : According to the question,
 $\therefore 288 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$
 and $468 = 2 \times 2 \times 3 \times 3 \times 13$
 \therefore HCF of 288 and 468 = $2 \times 2 \times 3 \times 3$
 = 36
 Hence, the largest number is 36 that will divide both 288 and 468 without leaving any remained.

110. Find the smallest number which is divisible by 10, 14 and 28 is a perfect square.

(a) 19600 (b) 4900
 (c) 140 (d) 18600

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (b) : LCM of 10, 14 and 28 = 140

From option (b) $\frac{4900}{140} = 35$

Hence, the number 4900 is the smallest perfect square of the given number.

111. Which of the following is the least number that should be added to 3496, so that the sum is exactly divisible by 2, 6, 4 and 3 ?

(a) 11 (b) 8
 (c) 15 (d) 4

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (b) : L.C.M of 2, 6, 4 and 3 = 12

$$\begin{array}{r} 12 \overline{) 3496} \\ \underline{24} \\ 109 \\ \underline{108} \\ 16 \\ \underline{12} \\ 4 \end{array}$$

Hence, on adding the number $12 - 4 = 8$ in 3496, the sum (3504) is exactly divisible by 2, 6, 4 and 3.

112. How many four-digit numbers are completely divisible by 5, 12 and 18?

(a) 49 (b) 47
 (c) 48 (d) 50

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (d) : L.C.M. of 5, 12 and 18 = 180
 Smallest 4 -digit numbers divisible by 180,

$$\begin{array}{r} 180 \overline{) 1000} (5 \\ \underline{900} \\ 100 \end{array}$$

Number = $1000 + 80 = 1080$

(Adding 80 to 1000 will completely divisible this number by 180)

Greatest 4-digit numbers divisible by 180,

$$\begin{array}{r} 180 \overline{) 9999} (55 \\ \underline{900} \\ \times 999 \\ \underline{900} \\ \times 99 \end{array}$$

Number = $9999 - 99 = 9900$

\therefore Last term = First term + $(n - 1)d$

$9900 = 1080 + (n - 1) 180$

$8820 = (n - 1) 180$

$n - 1 = 49$

$n = 50$

So, there are 50 four digits numbers which will be divisible by 180.

213. Find the least number, which is exactly divisible by 12, 15, and 18.

- (a) 160 (b) 120
(c) 180 (d) 240

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (c) : The least number, which is exactly divisible by 12, 15 and 18 = LCM of 12, 15 and 18.

Hence, LCM of 12, 15 and 18 = 180

114. What least number should be added to 3500 to make it exactly divisible by 42, 49, 56 and 63?

- (a) 24 (b) 22
(c) 26 (d) 28

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (d) : LCM of 42, 49, 56, and 63 = $7^2 \times 2^3 \times 3^2$
= 3528

Required number = 3528 – 3500 = 28

115. The greatest number of four digits which is divisible by 15, 20, 25, and 45 is.

- (a) 9090 (b) 9900
(c) 9990 (d) 9000

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (b) : The greatest number of four digits which is completely divisible by 15, 20, 25 and 45 = [LCM(15, 20, 25, 45)] K

$$N = 900 K$$

$$\text{Keeping } K = 11$$

$$\therefore N = 900 \times 11 = 9900$$

116. What is the smallest number which when increased by 3 is divisible by 27, 35, 25 and 21?

- (a) 4725 (b) 317
(c) 4728 (d) 4722

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (d) :

Required number = LCM of 27, 35, 25 and 21 – 3

$$= 4725 - 3$$

$$= 4722$$

117. The least perfect square number completely divisible by 4, 5, 9 and 12 is?

- (a) 900 (b) 400
(c) 2500 (d) 3600

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (a) : L.C.M. of 4, 5, 9 and 12

$$= 2 \times 2 \times 3 \times 3 \times 5$$

$$= 180$$

2	4	5	9	12
2	2	5	9	6
3	1	5	9	3
3	1	5	3	1
5	1	5	1	1
	1	1	1	1

$$\text{Number} = 180 \times n$$

$$n = 5$$

$$= 180 \times 5 = 900$$

Hence the least perfect square number is **900** which is divisible by 4, 5, 9 and 12.

118. The least number that should be added to 1549 so that the sum is exactly divisible by 2, 3, 5 and 7 is.

- (a) 210 (b) 131
(c) 79 (d) 1339

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (b) : Given number = 1549

Now, L.C.M. of 2, 3, 5 and 7 = 210

Now dividing 1549 by 210,

$$210 \overline{) 1549} 7$$

$$\underline{1470}$$

$$79$$

Remainder = 79

Now the number to be added to 1549 so that the sum obtained is completely divisible by 2, 3, 5 and 7 = 210 – 79 = 131

119. The least number which should be added to 4707 so that the sum is exactly divisible by 4, 5, 6 and 8 is:

- (a) 73 (b) 93
(c) 83 (d) 63

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (b) : L.C.M. of 4, 5, 6, 8 = 120

Number greater than 4707 which is divisible by 120

$$= 120 \times 40 = 4800$$

Number to be added = 4800 – 4707

$$= 93$$

120. The number between 6000 and 7000 that is divisible by each of 12, 21, 32 and 18 is.

- (a) 6048 (b) 6064
(c) 6480 (d) 6040

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (a) : L.C.M. of 12, 21, 32 and 18 = 2016

Required number = 2016k

Let, taking k = 3

$$\text{Required number} = 2016 \times 3$$

$$= 6048$$

121. The least number that should be added to 5474, so that the sum is exactly divisible by 3, 4, 6 and 8 is:

- (a) 23 (b) 24
(c) 22 (d) 21

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (c) : L.C.M. of 3, 4, 6 and 8 = 24

$$\begin{array}{r} 24 \overline{) 5474} 228 \\ \underline{48} \\ 67 \\ \underline{48} \\ 194 \\ \underline{192} \\ 2 \end{array}$$

Number = 24 – 2

$$= 22$$

The least number is 22 which when added to divisible the number.

122. The greatest number of five digits which is completely divisible by 12, 22, 42 and 55 is:

(a) 99025 (b) 97020
(c) 94010 (d) 96050

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : L.C.M of 12, 22, 42 and 55 = 4620

The greatest five digit number = 99999

$$\frac{99999}{4620} = 21.6448052$$

So, required number = 4620×21
= 97020

123. Find the smallest square number which is exactly divisible by 4, 9 and 14.

(a) 1008 (b) 252
(c) 1764 (d) 504

RRB NTPC 17.01.2017 Shift-2

Ans : (c) LCM of 4, 9 and 14

$$\begin{array}{r|rrrr} 2 & 4, & 9, & 14 \\ 2 & 2, & 9, & 7 \\ 7 & 1, & 9, & 7 \\ 3 & 1, & 9, & 1 \\ 3 & 1, & 3, & 1 \\ & 1, & 1, & 1 \end{array}$$

LCM = $2 \times 2 \times 3 \times 3 \times 7 = 252$

252 is not a square number. But its multiple 1764 is a square number.

So, from options 1764 is the required number.

124. What is the smallest 5-digit number which is exactly divisible by 12, 24, 48, 60 and 96?

(a) 10000 (b) 10024
(c) 10160 (d) 10080

RRB NTPC 03.04.2016 Shift : 1

Ans : (d) LCM of given numbers,

$$\begin{array}{r|rrrrrr} 2 & 12, & 24, & 48, & 60, & 96 \\ 2 & 6, & 12, & 24, & 30, & 48 \\ 2 & 3, & 6, & 12, & 15, & 24 \\ 2 & 3, & 3, & 6, & 15, & 12 \\ 2 & 3, & 3, & 3, & 15, & 6 \\ 3 & 3, & 3, & 3, & 15, & 3 \\ 5 & 1, & 1, & 1, & 5, & 1 \\ & 1, & 1, & 1, & 1, & 1 \end{array}$$

LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 480$

The smallest 5-digit number = 10000

$$480 \overline{)10000(20}$$

$$\underline{9600}$$

$$400$$

So, the required number = $10000 + (480 - 400)$
= 10080

125. Find is the largest 3-digit number which is exactly divisible by 15, 25 and 30?

(a) 900 (b) 930
(c) 960 (d) 975

RRB NTPC 28.03.2016 Shift : 2

Ans : (a) LCM of 15, 25 and 30 = 150

The largest three digit number = 999

$$150 \overline{)999(6}$$

$$\underline{900}$$

$$\times 99$$

So, the required number = $999 - 99 = 900$

126. Find the smallest number which, when doubled is exactly divisible by 14, 35, 28 and 91.

(a) 14 (b) 1820
(c) 910 (d) 1260

RRB NTPC 22.04.2016 Shift : 3

Ans : (c) According to the question,

LCM of 14, 35, 28 and 91

$$\begin{array}{r|rrrr} 2 & 14, & 35, & 28, & 91 \\ 7 & 2, & 5, & 4, & 13 \\ & 1, & 5, & 2, & 13 \end{array}$$

LCM = $2 \times 7 \times 5 \times 2 \times 13 = 1820$

So, the required number = $\frac{1820}{2} = 910$

127. Find the smallest number which is exactly divisible by 6, 8, 12 and 16.

(a) 48 (b) 24
(c) 64 (d) 80

RRB NTPC 27.04.2016 Shift : 3

Ans : (a) The required number = LCM of 6, 8, 12 and 16

On finding the LCM by common division method,

$$\begin{array}{r|rrrr} 2 & 6, & 8, & 12, & 16 \\ 2 & 3, & 4, & 6, & 8 \\ 2 & 3, & 2, & 3, & 4 \\ 2 & 3, & 1, & 3, & 2 \\ 3 & 3, & 1, & 3, & 1 \\ & 1, & 1, & 1, & 1 \end{array}$$

LCM = $2 \times 2 \times 2 \times 2 \times 3 = 48$

Type - 9 Miscellaneous

128. Find 150% of X, if X is the least number which when divided by 6, 7, 8, 9 and 12 leaves remainders 2, 3, 4, 5 and 8 respectively.

(a) 750 (b) 500
(c) 1000 (d) 1200

RRB NTPC 18.04.2016 Shift : 1

Ans : (a) According to the question,
The number when divided by 6, 7, 8, 9 and 12 leaves remainders 2, 3, 4, 5 and 8 respectively.

$$6 - 2 = 4$$

$$7 - 3 = 4$$

$$8 - 4 = 4$$

$$9 - 5 = 4$$

$$12 - 8 = 4$$

The number = (LCM of 6, 7, 8, 9 and 12) - 4

2	6	7	8	9	12
2	3	7	4	9	6
2	3	7	2	9	3
3	3	7	1	9	3
3	1	7	1	3	1
7	1	7	1	1	1
1	1	1	1	1	1

$$= (2 \times 2 \times 2 \times 3 \times 3 \times 7) - 4 = 504 - 4 = 500$$

$$\text{So, } 150\% \text{ of the number} = 500 \times \frac{150}{100}$$

$$= 5 \times 150 = 750$$

129. The ratio of two numbers is 11:4 and their HCF is 16. What is the sum of these two numbers?

- (a) 240 (b) 320
(c) 256 (d) 224

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (a) :

Let the two numbers are $11x$ and $4x$ respectively.

Given, $x = \text{HCF} = 16$

$$\text{First Number} = 11 \times 16 = 176$$

$$\text{Second number} = 4 \times 16 = 64$$

$$\text{Sum of numbers} = 176 + 64 = 240$$

130. The ratio of two numbers is 2 : 3 and their LCM is 120. What is the smallest of two numbers?

- (a) 40 (b) 20
(c) 50 (d) 30

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (a) : Let numbers are $2x$ and $3x$.

Given,

$$\text{LCM} = 120, \text{HCF} = x \text{ (Let)}$$

$$\therefore \text{LCM} \times \text{HCF} = 2x \times 3x$$

$$\Rightarrow 120 \times x = 6x^2$$

$$\therefore x = \frac{120}{6} = 20$$

So, smallest number = $2x$

$$= 2 \times 20$$

$$= 40$$

131. The LCM of two numbers is 721, and the numbers are in the ratio of 1 : 7. What is the sum of the numbers?

- (a) 825 (b) 728
(c) 721 (d) 824

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the numbers is x and $7x$

Then, LCM of numbers = $7x$

According to the question,

$$\therefore 7x = 721$$

$$x = 103$$

Hence the total of numbers = $x + 7x$

$$= 103 + 7 \times 103$$

$$= 103 + 721$$

$$= 824$$

132. What is the ratio of the L.C.M. and H.C.F. of the number 56 and 84?

- (a) 2 : 3 (b) 3 : 2
(c) 6 : 1 (d) 7 : 2

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (c) : LCM of 56, 84 = 168

and HCF = 28

2	56,	84
2	28,	42
2	14,	21
3	7,	21
7	7,	7
	1,	1

$$\text{Required Ratio} = \frac{168}{28} = \frac{6}{1} \Rightarrow 6:1$$

133. Find three numbers such that their ratio is 3 : 4 : 5 and their HCF is 7.

- (a) 12, 16, 20 (b) 21, 28, 35
(c) 24, 32, 40 (d) 6, 8, 10

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the three numbers is $3x$, $4x$ and $5x$.

HCF = $x = 7$

Hence Numbers $3x = 3 \times 7 = 21$

$$4x = 4 \times 7 = 28$$

$$5x = 5 \times 7 = 35$$

134. The LCM of two numbers is 78. And the ratio of these numbers is 2:3. Find the sum of these numbers.

- (a) 60 (b) 26
(c) 65 (d) 39

RRB NTPC 30.03.2016 Shift : 2

Ans : (c) Let the numbers are $2x$ and $3x$.

So, the LCM = 78

$$2 \times 3 \times x = 78$$

$$x = 13$$

So, the required sum = $(5x) = 5 \times 13 = 65$

Type - 1 Problems Based on Basic Concept of Percentage

1. If 27.5% of a number is 11, then the number is:
(a) 44 (b) 36 (c) 40 (d) 48

RRB NTPC (Stage-2) 17/06/2022 (Shift-II)

Ans. (c) : Let the number be k
According to the question,
 $k \times 27.5\% = 11$

$$\Rightarrow k \times \frac{275}{100 \times 10} = 11$$

$$\Rightarrow k = 40$$

2. If 75% a number is added to 75, then the result is the number itself. The number is:

(a) 300 (b) 200 (c) 250 (d) 350

RRB NTPC (Stage-2) 14/06/2022 (Shift-I)

Ans. (a) : Let the number be x
According to the question,

$$x \times \frac{75}{100} + 75 = x$$

$$\Rightarrow \frac{3x}{4} + 75 = x$$

$$\Rightarrow 4x - 3x = 75 \times 4$$

$$\Rightarrow x = 300$$

3. Find the value of k , if $k\%$ of 280 = 50% of 350
(a) 60 (b) 72.5 (c) 62.5 (d) 75

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (c) : According to the question,
 $K\% \text{ of } 280 = 50\% \text{ of } 350$

$$280 \times \frac{K}{100} = \frac{350}{100} \times 50$$

$$K = \frac{250}{4}$$

$$K = 62.5$$

4. If 22.5 of 32% $-\frac{2}{3} \times \sqrt[3]{512} \times \sqrt{81} = y$, then the value of y is:

(a) -41.2 (b) -41.8
(c) -40.2 (d) -40.8

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (d) : $22.5 \times 32\% - \frac{2}{3} \times \sqrt[3]{512} \times \sqrt{81} = y$

$$22.5 \times 32\% - \frac{2}{3} \times 8 \times 9 = y$$

$$0.225 \times 32 - 48 = y$$

$$7.2 - 48 = y$$

$$y = -40.8$$

5. If the amount in a bill is decreased by 10%, then ₹ 279 is to be paid. How much is the original bill?

(a) ₹ 280 (b) ₹ 300 (c) ₹ 310 (d) ₹ 330

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let us assume original bill = ₹ x

If deducting the 10% of bill = $0.9x$

As per question,

$$0.9x = 279$$

$$x = \frac{279}{0.9}$$

$$x = ₹ 310$$

6. The difference between 48% and 38% of a number is 354. What is 58% of that number?

(a) 2034.6 (b) 1893.78
(c) 1987.56 (d) 2053.2

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let the numbers is x
Hence,

$$\frac{x \times 48}{100} - \frac{x \times 38}{100} = 354$$

$$\frac{48x - 38x}{100} = 354$$

$$10x = 35400$$

$$x = 3540$$

Now, 58% of numbers

$$3540 \times \frac{58}{100} = 2053.2$$

7. Two numbers A and B are less than a third number C by 15% and 32% respectively. By what percentage is number B less than number A?

(a) 20 (b) 80 (c) 68 (d) 32

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question-
From first condition-

$$A = C - C \times \frac{15}{100} = 0.85C$$

From second condition-

$$B = C - C \times \frac{32}{100} = 0.68C$$

$$\text{Required \% reduction} = \frac{0.85 - 0.68}{0.85} \times 100$$

$$= 20\%$$

8. Two fifth of seven seventeenth of three fifth of a number is 84. Find 40% of that number?

(a) 850 (b) 570
(c) 280 (d) 340

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let numbers = x
According to the question,

$$x \times \frac{3}{5} \times \frac{7}{17} \times \frac{2}{5} = 84$$

$$x = 850$$

$$40\% \text{ of } 850 = \frac{850 \times 40}{100} = 340$$

9. In a group of 60 students, 65% mentioned their gender as 'Male' and 30% mentioned their gender as 'Female'. How many students have not mentioned their gender?
(a) 2 (b) 3 (c) 5 (d) 4

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (b) Total number of students = 60
According to the question,

$$\text{Number of Males} = 60 \times \frac{65}{100} = 39$$

$$\text{Now, Number of Females} = 60 \times \frac{30}{100} = 18$$

Number of students who have not mentioned their gender = $60 - (39 + 18)$
 $= 60 - 57 = 3$

10. In a class, the ratio of girls and boys is 13:12. Find the percentage of the girls in the class.
(a) 25% (b) 48% (c) 13% (d) 52%

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (d) : Ratio of girls and boys = 13 : 12
 \therefore Total number of the students in the class = 25
 \therefore Percentage of girls = $\frac{13}{25} \times 100$
 $= 13 \times 4 = 52\%$

11. 50% of a number is 21 less than $\frac{4}{5}$ th of that number. Find the number.
(a) 40 (b) 70 (c) 60 (d) 50

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number is x
According to the question,

$$x \times \frac{50}{100} = x \times \frac{4}{5} - 21$$

$$\Rightarrow \frac{x}{2} = \frac{4x}{5} - 21$$

$$\Rightarrow \frac{4x}{5} - \frac{x}{2} = 21$$

$$\Rightarrow \frac{8x - 5x}{10} = 21$$

$$\Rightarrow 3x = 210$$

$$\Rightarrow x = 70$$

12. In a college, there are 3600 students, out of which 82% are football players, 7% are kabaddi players, 4% are chess players and the remaining are cricket players. The number of cricket players is:
(a) 252 (b) 126 (c) 136 (d) 152

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (a) :

Total number of students in the college = 3600
Number of football players = $3600 \times \frac{82}{100} = 2952$

Number of kabaddi players = $3600 \times \frac{7}{100} = 252$

Number of chess players = $3600 \times \frac{4}{100} = 144$

Number of cricket players = $3600 - (2952 + 252 + 144)$
 $= 3600 - 3348 = 252$

13. 40% of the first number is 12 and 50% of the number is 24. The ratio of the first number to the second number is:

- (a) 8 : 5 (b) 4 : 5
(c) 5 : 8 (d) 1 : 2

RRB NTPC 15.03.2021 (Shift-II) Stage I

Ans. (c) : Let the first number = x

The second number = y

According to the question,

$$\frac{x \times 40}{100} = 12$$

$$\text{or } x = \frac{12 \times 100}{40} = 30$$

$$\frac{y \times 50}{100} = 24$$

$$\text{or } y = \frac{24 \times 100}{50} = 48$$

Ratio of the first number (x) and second number (y)

$$\Rightarrow \frac{x}{y} = \frac{30}{48}$$

$$\frac{x}{y} = \frac{5}{8}$$

$$\text{or } x : y = 5 : 8$$

14. A football team lost 40% of the matches it played. If it won 75 matches, then find the number of matches is played.

- (a) 125 (b) 140
(c) 110 (d) 130

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (a) : % of matches win = $(100 - 40)\%$
 $= 60\%$

$$\text{Total number of matches} = \frac{\text{Won matches}}{\% \text{ of matches won}} \times 100$$

$$= \frac{75}{60} \times 100$$

$$= 125$$

15. 60% of 40% of 32% of an amount is Rs. 432. What is the amount (in Rs.)?

- (a) 5,625 (b) 5,555
(c) 5,525 (d) 5,605

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the amount = ₹x

According to the question,

$$x \times \frac{60}{100} \times \frac{40}{100} \times \frac{32}{100} = 432$$

$$x \times \frac{3}{5} \times \frac{2}{5} \times \frac{8}{25} = 432$$

$$x = 9 \times 5 \times 5 \times 25$$

$$x = 625 \times 9$$

$$x = ₹5,625$$

- 16. A number, when 42 is subtracted from it, reduces to its 70%. What is two-fifth of that number?**

(a) 84 (b) 140 (c) 100 (d) 56

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (d) Let the number = x

According to the question,

$$x - 42 = x \times 70\%$$

$$x - 42 = x \times \frac{7}{10}$$

$$10x - 420 = 7x$$

$$3x = 420$$

$$x = 140$$

$$\therefore \frac{2}{5} \text{ part of this number} = x \times \frac{2}{5} = 140 \times \frac{2}{5} = 56$$

- 17. The income of A is 25% less than the income of B whose income is 40% more than that of C. The income of C is 20% less than that of D. By what percent is the income of A more than the income of C?**

(a) 8% (b) 5% (c) 10% (d) 4%

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) : Let D's income be = ₹ 100

According to question,

Ratio of income

A		B		C		D
$112 \times \frac{75}{100} = 84$:	$\frac{80 \times 140}{100} = 112$:	80	:	100
21	:	28	:	20	:	25

$$\text{Required \%} = \frac{21-20}{20} \times 100 = 5\%$$

- 18. Number A is eight times as large as number B. By what percentage is number B less than number A?**

(a) 20% (b) 80%
(c) 87.5% (d) 12.5%

RRB NTPC (Stage-II) 15/06/2022 (Shift-II)

Ans. (c) : Let the number of A and B be 8x and x respectively.

$$\therefore \begin{matrix} A & B \\ 8x & x \end{matrix}$$

$$\text{Difference} = 8x - x = 7x$$

$$\text{Required less \%} = \frac{7x}{8x} \times 100 = 87.5\%$$

- 19. If 15% of A : 25% of B :: 8 : 11, then A : B is equal to :**

(a) 33:32 (b) 5 : 4 (c) 40 : 33 (d) 4 : 33

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (c) : Given,

$$15\% \text{ of A : } 25\% \text{ of B :: } 8 : 11$$

$$\Rightarrow \frac{A \times 15\%}{B \times 25\%} = \frac{8}{11}$$

$$\frac{3A}{5B} = \frac{8}{11}$$

$$\Rightarrow 33A = 40B$$

$$\therefore \boxed{A : B = 40 : 33}$$

- 20. Find the value of k, if 18% of 450 = 30% of k.**

(a) 270 (b) 750 (c) 250 (d) 320

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (a) : Given,

$$18\% \text{ of } 450 = 30\% \text{ of } K$$

$$\Rightarrow 450 \times \frac{18}{100} = \frac{K \times 30}{100}$$

$$\therefore \boxed{K = 270}$$

- 21. If X's income is 40% less than that of Y, then Y's income is approximately what percentage more than that of X?**

(a) 66.33% (b) 66.67%
(c) 67.67% (d) 67.33%

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (b) : Let-

$$Y = 100 \text{ units}$$

$$X = 60 \text{ units}$$

$$\text{Required percentage} = \frac{40}{60} \times 100$$

$$= \frac{200}{3} = 66.67\%$$

- 22. If the income of the Sachin exceeds the income of Sohan with 50/7% then Sohan's income is approximately what percentage less than Sachin income**

(a) 6.67% (b) 8.67% (c) 5.67% (d) 7.67%

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (a) : Let the income of Sohan = 100

$$\text{So the income of Sachin} = 100 + 100 \times \frac{50}{7 \times 100}$$

$$= 100 + \frac{50}{7} = \frac{750}{7}$$

$$\text{Income of Sachin} - \text{Income of Sohan} = \frac{750}{7} - 100 = \frac{50}{7}$$

$$\text{Required percentage} = \frac{\frac{50}{7}}{\frac{750}{7}} \times 100$$

$$= \frac{50}{7} \times \frac{7}{750} \times 100 = \frac{100}{15} = \frac{20}{3}$$

$$= \boxed{6.67\%}$$

23. What percentage of a day is 3 h?

- (a) $16\frac{1}{2}\%$ (b) $10\frac{1}{2}\%$
(c) $14\frac{1}{2}\%$ (d) $12\frac{1}{2}\%$

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (d) : Let x% of a day be equal to 3 hours.
According to the question-

$$24 \times \frac{x}{100} = 3$$

$$x = \frac{100}{8} = \frac{25}{2} = 12\frac{1}{2}\%$$

24. If A's salary is 20% less than B's then by what percentage is B's salary more than A's ?

- (a) 20% (b) 25% (c) $33\frac{1}{3}\%$ (d) $16\frac{2}{3}\%$

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$B \times \frac{80}{100} = A \Rightarrow A = \frac{4B}{5}$$

$$A : B = 4 : 5$$

$$\text{Required percentage} = \frac{5-4}{4} \times 100$$

$$= \frac{1}{4} \times 100 = 25\%$$

25. The price of rice is increased by 25%. By what percent should a family decrease its consumption so that their expenditure remains the same?

- (a) 25% (b) 7.5% (c) 5% (d) 20%

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let, price of rice = ₹100

And consumption of rice = 100 kg

So, total cost = $100 \times 100 = ₹10,000$

Price of rice after 25% increment = ₹125

Let consumption after increase = x kg

According to the question,

$$x \times 125 = 10,000$$

$$x = 80$$

Hence, percentage reduction in consumption of rice

$$= \frac{100-80}{100} \times 100\%$$

$$= 20\%$$

26. The numbers x and y are such that $x : y = 4 : 5$. If x is more than z by 20%, then y will be more than z by.

- (a) 40% (b) 30% (c) 50% (d) 60%

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given -

$$x : y = 4 : 5$$

According to the question,

$$x = z \times \frac{120}{100}$$

$$x : z = 6 : 5$$

$$\text{Or } z : x = 5 : 6$$

$$\text{And } x : y = 4 : 5$$

With the help of above ratio,

$$\therefore z : x : y = 20 : 24 : 30$$

Hence, the percentage of y greater than z.

$$= \frac{y-z}{z} \times 100\% = \frac{10}{20} \times 100$$

$$= 50\%$$

27. A vendor purchased 300 mangoes for ₹600. Some of the mangoes were rotten and were thrown away. He sold the remaining mangoes at ₹3 each and made a profit of ₹210. The percentage of mangoes thrown away is

- (a) 10% (b) 20%
(c) 5% (d) 30%

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (a) : Selling price (SP) = ₹600

Let number of rotten mangoes = x

Remaining mangoes = $(300 - x)$

According to the question,

$$(300 - x) \times 3 = (600 + 210)$$

$$900 - 3x = 810$$

$$x = 30$$

$$\text{Percentage of rotten mangoes} = \frac{30}{300} \times 100 = 10\%$$

28. Ananya and Babita have respectively 20% and 28% less money than their friend Kavita by what percentage has Babita less money than Ananya :

- (a) 20 (b) 90
(c) 48 (d) 10

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (d) Let the friend of Ananya and Babita has amount = ₹100

Friend Ananya Babita

₹100 ₹80 ₹72

Babita has less% of money than Ananya

$$= \frac{8}{80} \times 100 = 10\%$$

29. A class of 50 girls and 70 boys sponsored a musical programme. If 40% of the girls and 50% of the boys attended, approximately what percentage of the class attended the programme?

- (a) 46% (b) 42% (c) 48% (d) 44%

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (a) : Total numbers of students in class = $50 + 70 = 120$

No. of present students in musical programme

$$= 50 \times \frac{40}{100} + 70 \times \frac{50}{100}$$

$$= 20 + 35$$

$$= 55$$

Hence, percentage of class present in the programme

$$= \frac{55}{120} \times 100$$

$$= 45.83 \approx 46\%$$

30. 12.5% of the first number is 37.5% of the second number. If the second number is subtracted from the first number. We get an answer of 1428. Find the sum of the two numbers.

(a) 2846 (b) 2856
(c) 2936 (d) 2716

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (b) : According to the question,

$$12.5 \times I = 37.5 \times II$$

$$\frac{I}{II} = \frac{37.5}{12.5}$$

$$I : II = 3 : 1$$

Then, $3 - 1 = 2$ unit $\rightarrow 1428$

1 unit $\rightarrow 714$

\therefore Sum of both numbers $= 3 + 1$
 $= 4$ unit
 $= 4 \times 714$
 $= 2856$

31. If 24% of a number is 39, then what is the number?

(a) 162.5 (b) 161.5
(c) 160.5 (d) 163.5

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (a) : Let number be $= x$

According to the question,

$$x \times 24\% = 39$$

$$x = \frac{39 \times 100}{24} = 162.5$$

32. If A's height is 25% less than that of B, then approximately by how much percentage height of B's is greater than that of A?

(a) 33% (b) 75% (c) 50% (d) 25%

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let,

B's height $= 100$ m

$$A's \text{ height} = 100 \times \frac{75}{100} = 75 \text{ m}$$

According to the question-

$$B's \text{ height greater than that of A} = \frac{(100 - 75)}{75} \times 100$$

$$= \frac{25}{75} \times 100 = 33.33\%$$

$$= 33\% \text{ (Approx)}$$

33. 44% of a number is 798.6. What is 63% of that number?

(a) 1143.8 (b) 1143.45
(c) 1143.46 (d) 1143.47

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number $= x$

From question,

$$\frac{x \times 44}{100} = 798.6$$

$$x = 1815$$

$$\therefore 63\% \text{ of } x = \frac{1815 \times 63}{100} = 1143.45$$

34. A fruit seller has some oranges. He sells 60% of them and still has 360 oranges. Originally, he had _____ oranges.

(a) 930 (b) 920
(c) 950 (d) 940

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (c) : Let the fruit seller had x oranges.

The remaining oranges after the sale of 60% of the oranges $= 40\%$

According to the question-

$$x \times \frac{40}{100} = 360$$

$$x = 900$$

35. If 28% of a number is 20, then what is the value of 49% of the same number?

(a) 45.5 (b) 42
(c) 38.5 (d) 35

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let, the number be x .

According to the question-

$$x \times \frac{28}{100} = 20$$

$$x = \frac{20 \times 25}{7}$$

Now, the value of 49% of the number x .

$$= \frac{20 \times 25}{7} \times \frac{49}{100}$$

$$= 35$$

36. 50% of 500 = _____ of 2500

(a) 30% (b) 40%
(c) 20% (d) 10%

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (d) : 50% of 500 $= x\%$ of 2500

$$500 \times \frac{50}{100} = 2500 \times x\%$$

$$x\% = \frac{500 \times 50}{2500 \times 100}$$

$$x = \frac{1}{10} \times 100$$

$$x = 10\%$$

37. If the price of sugar falls by 25%, by how much percentage must a household increase in its consumption so that the budget remains the same?

(a) $33\frac{2}{3}\%$ (b) $33\frac{1}{4}\%$
(c) $33\frac{3}{4}\%$ (d) $33\frac{1}{3}\%$

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

$$\text{Ans. (d) : Required increase} = \frac{100 - 75}{75} \times 100$$

$$= \frac{25}{75} \times 100$$

$$= 33\frac{1}{3}\%$$

38. The price of tea has been reduced by 20%. In order to restore the original price, the new price must be increased by:

(a) 35% (b) 20% (c) 30% (d) 25%

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let initial price of tea = ₹100

Price of tea after reducing = ₹80

$$\begin{aligned}\text{Required growth} &= \frac{100-80}{80} \times 100 \\ &= 25\%\end{aligned}$$

39. If 40% of (a - b) is equal to 20% of (a + b), then b is what percentage of a?

(a) 25% (b) 35%
(c) 100/3% (d) 28%

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

(a - b) of 40% = (a + b) of 20%

$$\Rightarrow \frac{(a-b) \times 40}{100} = \frac{(a+b) \times 20}{100}$$

$$\Rightarrow 40a - 40b = 20a + 20b$$

$$\Rightarrow 20a = 60b$$

$$\Rightarrow a = 3b$$

$$\frac{a}{b} = \frac{3}{1}$$

$$\text{Required percentage} = \frac{1}{3} \times 100$$

$$= \frac{100}{3}\%$$

40. If A is 120% of B, then what percentage of (A+B) is B?

(a) $4\frac{5}{11}\%$ (b) $40\frac{5}{11}\%$
(c) $45\frac{5}{11}\%$ (d) $5\frac{4}{11}\%$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (c) : A is 120% of B

$$\therefore A = B \times \frac{120}{100}$$

$$\frac{A}{B} = \frac{6}{5}$$

$$\text{Required percentage} = \frac{5}{11} \times 100$$

$$= \frac{500}{11}$$

$$= 45\frac{5}{11}\%$$

41. If the price of tea increases by 20%, by what percentage should a household reduce its consumption of tea so that the budget remains the same?

(a) $15\frac{2}{3}\%$ (b) $16\frac{2}{3}\%$ (c) $14\frac{2}{3}\%$ (d) $13\frac{2}{3}\%$

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let the original price of the tea be ₹100
Increased price of the tea = ₹120

$$\text{Percentage decrease} = \frac{120-100}{120} \times 100$$

$$= \frac{20}{120} \times 100$$

$$= 16\frac{2}{3}\%$$

Hence the consumption of $16\frac{2}{3}\%$ of tea is to be decreased so that the expenditure on the remains the same.

42. In the new budget, the price of petrol has risen by 20%. By how much percentage must a motorist reduce consumption of petrol so that his expenditure on it does NOT increase?

(a) $16\frac{1}{2}\%$ (b) $16\frac{3}{4}\%$
(c) $16\frac{4}{5}\%$ (d) $16\frac{2}{3}\%$

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the motor driver reduce the consumption of petrol, so that his expenditure on petrol does not increase.

$$\therefore x = \frac{R}{100+R} \times 100$$

$$= \frac{20}{100+20} \times 100 \quad \{ \because \text{Given, } R = 20\% \}$$

$$= \frac{20}{120} \times 100$$

$$= 16\frac{2}{3}\%$$

43. Which number is 40% less than 80?

(a) 38 (b) 58
(c) 68 (d) 48

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : From question,

40% less than 80 = 60% of 80

$$\begin{aligned}&= 80 \times \frac{60}{100} \\ &= 48\end{aligned}$$

44. 75% of 75% is equal to:

(a) 0.5662 (b) 0.5625
(c) 0.5652 (d) 0.5666

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (b) : From question,

75% of 75%

$$= \frac{75}{100} \times \frac{75}{100}$$

$$= \frac{3}{4} \times \frac{3}{4}$$

$$= \frac{9}{16}$$

$$= 0.5625$$

45. Find the value of x, if 20% of 75 = 225 - x% of 420.
 (a) 50 (b) 1535
 (c) 20 (d) 3

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (a) : 20% of 75 = 225 - (x% of 420)

$$\frac{20}{100} \times 75 = 225 - x\% \text{ of } 420$$

$$15 = 225 - 4.2x$$

$$4.2x = 210$$

$$x = 50$$

46. When 106 is subtracted from a number, it reduces to its 47%. What is 11.5% of that number?
 (a) 13 (b) 31
 (c) 23 (d) 32

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let the number is x
 According to the question,

$$x - 106 = x \times \frac{47}{100}$$

$$x - \frac{47x}{100} = 106$$

$$53x = 10600$$

$$x = 200$$

$$11.5\% \text{ of } 200 = 200 \times \frac{11.5}{100} = 23$$

47. If 60% of a number is added to 36, gives the number itself then the number is:
 (a) 90 (b) 100
 (c) 75 (d) 80

RRB NTPC 17.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,
 $60\% + 36 = 100\%$
 $40\% = 36$
 $10\% = 9$
 $\therefore 100\% = 90$
 Hence the number = 90

48. 40% of a number is 46 less than $\frac{4}{5}$ of that number, find the number.
 (a) 110 (b) 105
 (c) 115 (d) 85

RRB NTPC 17.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the number is x
 According to the question,

$$x \times 40\% = x \times \frac{4}{5} - 46$$

$$x \times \frac{2}{5} = x \times \frac{4}{5} - 46$$

$$x \times \frac{2}{5} = 46$$

$$\Rightarrow x = 23 \times 5 = 115$$

49. 35% of a number is the same as 30% of another number. find the ratio of the first number to the second number.

- (a) 5 : 7 (b) 6 : 7
 (c) 7 : 9 (d) 8 : 9

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let first number A and second number B.
 According to the question, $A \times 35\% = B \times 30\%$

$$A \times \frac{35}{100} = B \times \frac{30}{100}$$

$$A \times 35 = B \times 30$$

$$A \times 7 = B \times 6$$

$$A : B = 6 : 7$$

50. If one-fourth of half of a number is 25, then 20% of that number is?

- (a) 40 (b) 80
 (c) 20 (d) 60

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the number is x
 According to the question,

$$\left(\frac{x}{2}\right) \times \frac{1}{4} = 25$$

$$x = 25 \times 8 = 200$$

$$20\% \text{ of } x = 200 \times \frac{20}{100} = 40$$

51. The difference between 82% and 73% of the same number is 72. What is 48% of the number?

- (a) 418 (b) 384
 (c) 360 (d) $\frac{1440}{31}$

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the number is x

$$x \times \frac{82}{100} - x \times \frac{73}{100} = 72$$

$$\frac{9x}{100} = 72$$

$$x = 800$$

$$48\% \text{ of number} = 800 \times \frac{48}{100} = 384$$

52. 25% of a number is 7 more than 30% of another number. The difference between the numbers is 29. What are the numbers?

- (a) 39 and 10 (b) 40 and 11
 (c) 34 and 5 (d) 37 and 8

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the two numbers x and y

\therefore According to the question,

$$25\% \times x = y \times 30\% + 7$$

$$\frac{25 \times x}{100} = \frac{y \times 30}{100} + 7$$

$$\frac{x}{4} = \frac{3y}{10} + 7$$

$$\frac{x}{4} = \frac{3y + 70}{10}$$

$$5x = 6y + 140$$

$$5x - 6y = 140 \dots\dots (1)$$

Again,

According to the question,

$$\therefore x - y = 29 \dots\dots (2)$$

From equation (1) and (2) $\times 5$

$$5x - 6y = 140$$

$$\underline{5x - 5y = 145}$$

$$y = 5$$

On putting the value of y in equation (2),

$$x - y = 29$$

$$x - 5 = 29$$

$$x = 34$$

Hence the numbers are 34 and 5

53. A number is first decreased by 20% and then increased by 15%. The number so obtained is 64 less than the original number. Find the original number.

- (a) 600 (b) 850
(c) 800 (d) 700

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the original number = x

According to the question,

$$x - x \times \frac{80}{100} \times \frac{115}{100} = 64$$

$$x - \frac{92x}{100} = 64$$

$$\frac{100x - 92x}{100} = 64$$

$$8x = 6400$$

$$\boxed{x = 800}$$

54. If the difference between a number and its 25% is 24, then the number is?
- (a) 28 (b) 32
(c) 40 (d) 34

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (b) : Let the number is x

According to the question,

$$x - x \times \frac{25}{100} = 24$$

$$\frac{75x}{100} = 24$$

$$x = \frac{24 \times 100}{75}$$

$$x = 32$$

55. If 15% of A is equal to 18% of B, then what percentage of B is equal to 20% of A ?
- (a) 42% (b) 20%
(c) 24% (d) 25%

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$A \text{ of } 15\% = B \text{ of } 18\%$$

$$A \times \frac{15}{100} = B \times \frac{18}{100}$$

$$\frac{A}{B} = \frac{18}{15} = \frac{6}{5}$$

On taking A = 6 and B = 5,

If x% of B is equal to 20% of A then

$$B \times \frac{x}{100} = A \times \frac{20}{100}$$

On putting the value of A and B,

$$5 \times \frac{x}{100} = 6 \times \frac{20}{100}$$

$$x = \frac{6 \times 20}{5} = 24\%$$

Hence, 24% of B is equal to 20% of A.

56. The difference of two numbers is 20% of the larger number. If the smaller number is 40, then find the larger number?

- (a) 50 (b) 40
(c) 60 (d) 45

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the largest number be x and the smallest number be y.

As per the question

$$x - y = \frac{x \times 20}{100}$$

$$x - 40 = \frac{x \times 20}{100} \quad \{\because y = 40\}$$

$$x - 40 = \frac{x}{5}$$

$$5x - 200 = x$$

$$5x - x = 200$$

$$4x = 200$$

$$x = \frac{200}{4} = 50$$

\therefore Largest number will be 50.

57. What is to be added to 12% of 2400, so that the sum will be equal to 18% of 5400?

- (a) 952 (b) 972
(c) 288 (d) 684

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (d) : Let the required number = x

According to the question,

$$2400 \times \frac{12}{100} + x = 5400 \times \frac{18}{100}$$

$$288 + x = 972$$

$$x = 972 - 288$$

$$x = 684$$

58. A team wins 45 games, which was 60% of played games. How many games were played by team?

- (a) 50 games (b) 75 games
(c) 60 games (d) 65 games

RRB NTPC 28.04.2016 Shift : 3

Ans : (b) Let the number of played games by the team be x.

According to the question,

$$x \times 60\% = 45$$

$$\Rightarrow x = \frac{45}{60} \times 100$$

$$\therefore x = \frac{3}{4} \times 100 = 75$$

So, the number of played games by the team is 75.

59. If x% of y = y% of z, then:

- (a) $x = z$ (b) $x = 3z$
(c) $x = 2z$ (d) $x = 4z$

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (a) : From question,

$$x \% \text{ of } y = y \% \text{ of } z$$

$$\Rightarrow \frac{x}{100} \times y = \frac{y}{100} \times z$$

$$\Rightarrow x = z$$

Type - 2

Problems Based on Exam and Students

60. Vimal secured 46% marks in the exam and failed to qualify in the exam by 10 marks. If he secured 52% marks, he would have secured 8 marks more than what was the minimum qualifying marks. What were the minimum marks one had to score to qualify in the exam?

- (a) 148 (b) 146
(c) 156 (d) 138

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (a) : Let total marks be x.

According to the question,

$$x \times 46\% + 10 = x \times 52\% - 8$$

$$(x \times 52\%) - (x \times 46\%) = 10 + 8$$

$$\frac{x \times 52}{100} - \frac{x \times 46}{100} = 18$$

$$\frac{52x - 46x}{100} = 18$$

$$\frac{6x}{100} = 18$$

$$6x = 1800$$

$$x = 300$$

On putting the value of x

$$\text{Minimum qualifying marks} = (300 \times 46\%) + 10$$

$$= \left(\frac{300 \times 46}{100} \right) + 10$$

$$= 138 + 10$$

$$= 148 \text{ marks}$$

61. In an examination Sunita scored 90% of what Anita scored, while Anita's score was 110% of what Vinita scored if Sunita scored 198 marks in the examination, how many marks did Vinita score ?

- (a) 200 (b) 242
(c) 220 (d) 180

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (a) : Given, Sunita's score = 198 marks

According to the question,

$$\text{Anita's score} = \frac{198}{90} \times 100$$

$$= 220$$

$$\text{Vinita's score} = \frac{220}{110} \times 100$$

$$= 200 \text{ marks}$$

62. Two students appeared for an entrance examination. One of them secured 15 marks more than the other and his marks are 80% of the sum of their marks. What are the marks obtained by each of them?

- (a) 5 and 20 (b) 6 and 21
(c) 8 and 23 (d) 4 and 19

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (a) : Let obtained marks by second student = x

Obtained marks by first student = (x+15)

$$x + 15 = (2x + 15) \times \frac{80}{100}$$

$$5x + 75 = 8x + 60$$

$$3x = 15$$

$$x = 5$$

Hence, Marks obtained by each of them = 5 and 20.

63. In a class 82% students passed and 2% students were placed in the reappear category. The number of students who failed was 592. What was the total number of students in the class?

- (a) 3700 (b) 3600
(c) 2000 (d) 2700

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let, no. of the total students in class = x

$$\text{Passed student} = x \times 82\% = x \times \frac{82}{100}$$

Again passed students in reappear category

$$= x \times 2\% = x \times \frac{2}{100}$$

$$\text{Total passed students} = x \times \frac{2}{100} + x \times \frac{82}{100}$$

$$= x \times \frac{84}{100}$$

$$\text{Failed students} = x - x \times \frac{84}{100} = x \times \frac{16}{100}$$

According to the question-

$$x \times \frac{16}{100} = 592$$

$$x = \frac{592}{16} \times 100$$

$$\boxed{x = 3700}$$

64. Tony should get 40% of the total marks to pass. He obtained 120 marks and failed by 30 marks. What are the total marks?

- (a) 500 (b) 400
(c) 300 (d) 375

RRB NTPC 11.03.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,
 $40\% = 120 + 30$
 $40\% = 150$
 $100\% = \frac{150}{40} \times 100$
 $= 375$

Hence, the total marks of exam = 375

- 65. Ravi and Rajesh wrote an entrance examination of join the M.Tech. programme. Ravi obtained 8 marks more than Rajesh and his marks were 52% of the sum of their marks. What are marks obtained by Ravi and Rajesh respectively?**

(a) 104, 96 (b) 100, 92
 (c) 90, 98 (d) 108, 100

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let Rajesh got x marks.
 Ravi got (x + 8) marks.
 According to the question,
 $x + 8 = (x + x + 8) \times \frac{52}{100}$
 $25x + 200 = 26x + 104$
 $26x - 25x = 200 - 104$
 $x = 96$

Hence, marks obtained by Ravi = x + 8 = 96 + 8 = 104
 Marks obtained by Rajesh = 96

- 66. In an examination 45% of the students qualified and 79750 are not qualified. How many students appeared for the examination ?**

(a) 140000 (b) 154000
 (c) 145250 (d) 145000

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the total students = 100%
 Qualified students = 45%
 Then unqualified students = (100 - 45) = 55%
 According to the question,
 $55\% = 79750$
 $100\% = \frac{79750}{55} \times 100$
 $\therefore 100\% = 145000$

- 67. In an examination, 80% students passed in Physics, 70% students passed in Chemistry while 15% students failed in both the subjects. If 325 students passed in both the subjects, find the total number of students who appeared in the examination.**

(a) 450 (b) 550
 (c) 200 (d) 500

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : Percentage of students passed in both subjects
 $= (80 + 70) - (100 - 15)$
 $= (150 - 85)\% = 65\%$ students
 As per question,
 65% of total students = 325
 Hence, total number of students = $\frac{325}{65} \times 100$
 $= 500$ students

- 68. A student must score 40% marks to pass an examination. He gets 70 marks and fails by 20 marks. Find the maximum marks.**

(a) 175 (b) 360 (c) 125 (d) 225

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (d) : Marks gain by the students = 70
 Marks gain to qualify the exam = 40% (maximum marks)

According to the question,

$$40\% = 70 + 20$$

$$\Rightarrow 40\% = 90$$

$$\Rightarrow 100\% = \frac{90}{40} \times 100$$

$$= 225$$

So, maximum marks = 225

- 69. Rahul had to appear for a test in four subjects. In the first three subjects the maximum marks were 50 each, in which Rahul secured 60% on an average. In the fourth subject Rahul scored 54 marks and his overall percentage is 64%. What were the maximum marks in the fourth subject ?**

(a) 75 (b) 80 (c) 84 (d) 60

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the total marks obtained by Rahul in the first three subjects = x

According to the question,

$$\frac{x}{150} \times 100 = 60$$

$$x = 90$$

Let the maximum marks of the fourth subject = y

$$\therefore \frac{(90 + 54)}{(150 + y)} \times 100 = 64$$

$$14400 = 9600 + 64y$$

$$y = \frac{4800}{64} = 75$$

- 70. If Mohan secured 72% marks in Physics and 68% in Chemistry, what percentage of marks did Mohan get in both subjects together, assuming that the two subjects have equal weightage?**

(a) 65% (b) 60% (c) 55% (d) 70%

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (d) : \therefore Weightage of both subjects are same.

\therefore Let the total marks of both subject is 100.

Now, marks obtained in Physics

$$= 100 \times \frac{72}{100} = 72 \text{ marks}$$

And marks obtained in Chemistry

$$= 100 \times \frac{68}{100} = 68 \text{ marks}$$

Percentage of marks obtained in both subjects

$$= \frac{\text{Total marks obtained in both subject}}{\text{Total marks of both subjects}} \times 100$$

$$= \frac{72 + 68}{100 + 100} \times 100 = 70\%$$

71. An examination requires 33% marks in order to pass. A candidate who gets 210 marks fails by 21 marks. What are the total marks for the examination?

(a) 500 (b) 400 (c) 700 (d) 350

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$210 + 21 = 33\%$$

$$33\% = 231$$

$$100\% = \frac{231}{33} \times 100$$

$$100\% = 700$$

Hence, total marks of examination = 700

72. Rakhi scored 12 marks more than Mohan. If Rakhi scored 54% marks out of a maximum of 200, then how much did Mohan score?

(a) 34 marks (b) 46 marks
(c) 69 marks (d) 96 marks

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (d) : Number scored by Rakhi

$$= 200 \times \frac{54}{100} = 108 \text{ marks}$$

Number scored by Mohan = $108 - 12 = 96$ marks

73. In an examination a student scored 65% marks but was 20 marks below the qualifying marks. Another student scored 80% marks and scored 5% more marks than the qualifying marks. Total marks of the examination are:

(a) 400 (b) 500 (c) 300 (d) 200

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the total marks of examination = x
According to the question,

$$x \times \frac{65}{100} + 20 = x \times \frac{80}{100} - x \times \frac{5}{100}$$

$$\frac{75x}{100} - \frac{65x}{100} = 20$$

$$\frac{10x}{100} = 20$$

$$x = 200$$

Hence, total marks of examination = 200

74. In order to qualify in an examination, one has to secure 50% of the overall marks. In the examination consisting of two papers, a student secured 40% in the first paper of 200 marks. Minimum what percentage of marks should be secured in the second paper of 150 marks in order to qualify in the examination?

(a) 65% (b) 60% (c) 68% (d) 64%

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (d) : From question,

Maximum marks of the first question paper = 200

Maximum marks of the second question paper = 150

$$\text{Minimum marks to qualify} = \frac{(200 + 150) \times 50}{100}$$

$$= \frac{350}{2} = 175 \text{ marks}$$

$$\text{Marks obtained in first question paper} = 200 \times \frac{40}{100} = 80$$

$$\text{Remaining minimum marks} = 175 - 80 = 95$$

$$\text{Required percentage of marks} = \frac{95}{150} \times 100 = 63.33\% \approx 64\%$$

75. In a class of 60 students 60% are boys. If 25% girls go to school by bicycle, then find the number of girls who do not go to school by bicycle?

(a) 24 (b) 27
(c) 18 (d) 36

RRB NTPC 18.01.2017 Shift : 2

Ans : (c) From question,

$$\text{Number of boys in 60 students} = \frac{60 \times 60}{100} = 36$$

$$\text{Then, number of girls} = 60 - 36 = 24$$

The number of girls who go to school by bicycle

$$= \frac{24 \times 25}{100} = 6$$

So, the required number of girls = $24 - 6 = 18$

76. A student scored 470 marks in 6 subjects. The maximum marks for each subject was 100. What was his score in percentage?

(a) 67.33% (b) 69.45%
(c) 78.33% (d) 78.67%

RRB NTPC 05.04.2016 Shift : 3

Ans : (c) Total marks = 600

Obtained marks = 470

$$\text{So, the required \%} = \frac{470 \times 100}{600} = 78.33\%$$

Type - 3 Problems Based on Income, Expenditure and Savings

77. Vikas spends 80% of his salary. His salary is increased by 25% and his expenditure increased by 15%. What is the percentage increase in his savings?

(a) 55% (b) 50%
(c) 60% (d) 65%

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (d) : Let income = ₹100

Expenditure + Saving = Income

$$80 + 20 = 100$$

From question,

$$\text{Increase in expenditure} = 80 \times \frac{15}{100} = 12$$

$$\text{Increase in income} = 100 \times \frac{25}{100} = 25$$

$$\text{Increase in saving} = 25 - 12 = 13$$

$$\text{Percentage increase in saving \%} = \frac{13}{20} \times 100 = 65\%$$

78. The sum of the salaries of A and B together is ₹4300. A spends 95% of his salary and B, 80% of his salary. If their savings are the same, what is A's salary ?
 (a) ₹3442 (b) ₹3430
 (c) ₹3440 (d) ₹3445

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let salary of A is x and salary of B is y.

$$\therefore x + y = 4300 \text{ (I)}$$

$$\therefore \text{Expenses of A} = 95\%$$

$$\therefore \text{Savings of A} = 5\%$$

$$\text{And expenses of B} = 80\%$$

$$\therefore \text{Savings of B} = 20\%$$

According to the question-

$$\text{Saving of A} = \text{Saving of B}$$

$$\therefore \frac{5x}{100} = \frac{20y}{100}$$

$$\Rightarrow 5x - 20y = 0$$

$$\Rightarrow x - 4y = 0 \text{ (II)}$$

On subtracting equation. (I and II),

$$5y = 4300$$

$$\Rightarrow y = 860$$

$$\therefore x = 3440 \text{ from equation (I)}$$

Hence, salary of A is ₹ 3440.

79. Ravi's salary is 20% more than Mohan's salary. If Mohan's salary is ₹1600 then Ravi's salary will be:
 (a) ₹1890 (b) ₹1920
 (c) ₹800 (d) ₹1750

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let, Mohan's salary $100x$ then Ravi's salary $120x$.

According to the question,

$$100x = 1600$$

$$x = 16$$

$$\text{Ravi's salary} = 120x$$

$$= 120 \times 16$$

$$= ₹1920$$

80. Ashok bhai spends 10% of his monthly income and saves ₹5400 every month. What is his monthly income?
 (a) ₹6,000 (b) ₹5,000
 (c) ₹6,400 (d) ₹5,400

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the monthly income of Ashok bhai is ₹x

$$\text{Savings} = x \times \frac{90}{100}$$

According to the question,

$$x \times \frac{90}{100} = 5400$$

$$x = ₹ 6000$$

81. A person pays as his debt ₹8960 per month for repayment of loan, which is 28% of his monthly salary. Calculate his monthly salary.
 (a) ₹32,000 (b) ₹34,000
 (c) ₹28,000 (d) ₹30,000

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) According to the question,
 $28\% = ₹8960$

$$\therefore 100\% = \frac{8960}{28} \times 100 = 32000$$

So, the monthly salary = ₹32000

82. 30% increment was done to an employee's salary, so that his salary became ₹ 910. What was his salary before increment?
 (a) ₹1300 (b) ₹880
 (c) ₹700 (d) ₹810

RRB NTPC 19.01.2017 Shift : 2

Ans : (c) Let the salary before increment = $100x$

Salary after increment = $130x$

According to the question,

$$130x = ₹910 \Rightarrow x = ₹ 7$$

So, the salary before increment

$$= 100x = 100 \times 7 = ₹700$$

Type - 4

Problems Based on Population

83. The population of a town increases by 10% every year. If the present population is 20,000 in the next year it will be:
 (a) 18,000 (b) 22,000
 (c) 2,200 (d) 1,800

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (b) : Next year population of the town

$$= 20,000 \times \frac{110}{100}$$

$$= 22,000$$

84. If the population of a village increased from 1,75,000 to 2,62,500 in 5 years, then find the average percentage increase in the population per year.
 (a) 15% (b) 9% (c) 10% (d) 12%

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) : Population of village = 175000

After 5 years, the population of village = 262500

$$\text{Increase in population} = 262500 - 175000$$

$$= 87500$$

Average increase in population per year

$$= \frac{87500}{5} = 17500$$

$$\text{So, percentage increase} = \frac{17500}{175000} \times 100 = 10\%$$

85. A bacterial population increases at the rate of 6% in the first 10 minutes and then 10% in the next 10 minutes. What is the overall percentage increase in the population at the end of 20 minutes?
 (a) 16% (b) 16.6% (c) 16.3% (d) 16.5%

RRB NTPC 08.02.2021 (Shift-II) Stage I

Ans. (b) :

The overall percentage increase in the population

$$= \left(6 + 10 + \frac{6 \times 10}{100} \right) \%$$

$$= (16 + 0.6) \%$$

$$= 16.6 \%$$

86. The population of a town is 10,000. If the male population increases by 5% and the female population by 10%, the population will become 10,800. How much of the town's present population is female?

(a) 7000 (b) 6000
(c) 8000 (d) 5000

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let, the number of males = x
And the number of females = (10,000 - x)
According to the question-

$$105\% \text{ of } x + 110\% \text{ of } (10,000 - x) = 10800$$

$$x \times \frac{105}{100} + (10,000 - x) \times \frac{110}{100} = 10800$$

$$\frac{21}{20}x + (10,000 - x) \times \frac{22}{20} = 10800$$

$$21x + 220000 - 22x = 10800 \times 20$$

$$22x - 21x = 220000 - 216000$$

$$x = 4000$$

Hence, the present number of females

$$= (10,000 - 4000)$$

$$= 6000$$

87. The population of a town increases at the rate of 10% every year. The present population is 1,000. In how many years will the population become 1,331?

(a) 3 (b) 2.5 (c) 2 (d) 3.5

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (a) : Let, n years will the population become 1,331.

We know that,

$$A = P \left[1 + \frac{r}{100} \right]^n$$

$$\frac{1331}{1000} = \left[1 + \frac{10}{100} \right]^n$$

$$\frac{1331}{1000} = \left[\frac{11}{10} \right]^n$$

$$\left(\frac{11}{10} \right)^3 = \left(\frac{11}{10} \right)^n$$

$$n = 3 \text{ years}$$

88. The population of Ludhiana city increases by 20% annually. If its present population is 8,47,000. What will be population in 2 years?

(a) 12,14,682 (b) 12,10,681
(c) 12,12,068 (d) 12,19,680

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : Present population = 8,47,000

According to the question,

$$\text{Population of city after 2 years} = 847000 \left(1 + \frac{20}{100} \right)^2$$

$$= 847000 \times \frac{36}{25}$$

$$= 12,19,680$$

89. The total population of a village is 4,000. The number of males and females increases by 10% and 20% respectively and consequently the population of the village becomes 4500. What was the number of males in the village prior to the new members coming in?

(a) 2500 (b) 3000 (c) 4000 (d) 2000

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let, the no. of males = x

And number of females = y

From the initial part of the question,

$$x + y = 4000$$

$$x = 4000 - y \quad \dots (1)$$

From the second part of the question,

$$x + x \times \frac{10}{100} + y + y \times \frac{20}{100} = 4500$$

$$\frac{110x + 120y}{100} = 4500$$

$$110x + 120y = 450000 \quad \dots (2)$$

On putting the value of x from eqⁿ-1 in eqⁿ-2,

$$110(4000 - y) + 120y = 450000$$

$$440000 - 110y + 120y = 450000$$

$$10y = 10000$$

$$y = 1000$$

∴ Number of females (y) = 1000

And number of males (x) = 4000 - y

$$= 4000 - 1000 = 3000$$

Type - 5

Problems Based on Percentage Change

90. If the salary of an employee is increased by 15% and subsequently reduced by 15%, then what will be the overall percentage reduction in the salary?

(a) 2.75 (b) 3.25 (c) 2.50 (d) 2.25

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (d) : Let the salary of employee ₹100

After increment of employee's salary by 15% = 115

$$\text{After reduction of 15\%} = \frac{85}{100} \times 115 = 97.75$$

Over all percentage reduction

$$= \frac{100 - 97.75}{100} \times 100 = 2.25\%$$

91. The price of an article was reduced by 15% and its daily sale increased by 25%. Find the net percentage effect on daily sale.

(a) 6.25% increase (b) 6.15% increase
(c) 6.1% increase (d) 6.35% increase

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (a) : We know that

$$\text{Net \% effect} = \left(-x + y - \frac{xy}{100} \right) \%$$

Where, -x = decrease

+ y = increase

$$\therefore \text{Net \% effect} = -15 + 25 - \frac{15 \times 25}{100}$$

$$= (10 - 3.75) \%$$

$$= 6.25\% \text{ increase}$$

92. A number was increased by 40% and then decreased by 40%. The net change in the number in percentage is:

(a) 32% decrease (b) 16% increase
(c) no change (d) 16% decrease

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (d) : From question,

$$\text{Percentage change} = 40\% - 40\% - \frac{40\% \times 40\%}{100} = -16\%$$

Here, '-' ve sign shows decrement.

93. The price of a mobile if first decreased by 20% and then increased by 10%. The net change in the price will be:

(a) 14% (b) 10% (c) 12% (d) 15%

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the initial price of mobile = ₹100

$$\text{Price after reduction of 20\%} = 100 \times \left(\frac{100 - 20}{100} \right) = ₹80$$

$$\text{Price after 10\% increment} = 80 \times \frac{(100 + 10)}{100} = ₹88$$

$$\text{Now, final change in price} = 100 - 88 = ₹12$$

$$\text{Hence, percentage change} = \frac{12}{100} \times 100 = 12\%$$

94. A man's working hours per day were increased by 35% and his wages per hour were decreased by 25%. By what percentage were his daily earnings increased?

(a) 1.25 (b) 1.2
(c) 1.35 (d) 1.3

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

$$\text{Ans. (a) : Percentage change} = \left(\pm x \pm y \pm \frac{xy}{100} \right)$$

Percentage increase in daily earning

$$\begin{aligned} &= 35 - 25 - \frac{35 \times 25}{100} \\ &= 10 - 8.75 \\ &= 1.25 \end{aligned}$$

95. On the first day 84500 people visited a trade fair. On the 4th day number reduced to 16900. By what percentage people reduced on the 4th day?

(a) 80% (b) 0% (c) 75% (d) 20%

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (a) : Number of people on the 4th day = 84500 - 16900

$$= 67600$$

$$\text{Reduced percentage} = \frac{67600}{84500} \times 100 = 80\%$$

96. A man's income at first increased by 20% and later on increased again by 30%. Find the total percent increase.

(a) 58 (b) 54
(c) 60 (d) 56

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) :

First method : Let man's income is ₹ x

$$\text{Income at first increased by 20\%} = \frac{120x}{100}$$

Income after again increased by 30%

$$= \frac{120x}{100} \times \frac{130}{100} = \frac{156x}{100}$$

$$\text{Percentage increased} = \frac{\frac{156x}{100} - x}{x} \times 100$$

$$\begin{aligned} &= \frac{56}{100} \times 100 \\ &= 56\% \end{aligned}$$

Second method :

$$\text{Percentage increased} = \left(x \pm y \pm \frac{x \times y}{100} \right)\%$$

$$20 + 30 + \frac{20 \times 30}{100} = 56\%$$

97. Sohan decreased his expenses by 25%. Later, he decreased then further by 10%. By what percentage did his expenses decrease altogether?

(a) 32.5% (b) 34.5%
(c) 31.5% (d) 33.5%

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (a) : When there are two successive reductions in the price of the article,

$$\text{Then percentage change} = \left(-x - y + \frac{x \times y}{100} \right)\%$$

$$x = 25, y = 10$$

$$\text{Then,} = -25 - 10 + \frac{25 \times 10}{100}$$

$$= -25 - 10 + 2.5$$

$$= -32.5 \text{ (Negative sign denotes reduction)}$$

So, overall his expenses decreased by 32.5%

98. A number is first decreased by 5% and then increased by 5%. What will be the net increase or decrease?

(a) 0.25% increase
(b) 25% decrease
(c) 0.25% decrease
(d) No increase or decrease

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : Decrease percentage in original number

$$= \left(\pm x \pm y \pm \frac{xy}{100} \right)\%$$

$$= -5 + 5 - \frac{5 \times 5}{100}$$

$$= 0.25\% \text{ decrease}$$

99. If a number is increased by 20% and then it is decreased by 10%. Its net increase or decrease is:

(a) 8% increase (b) 10% decrease
(c) 10% increase (d) 8% decrease

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the number = 100
 On increasing by 20% the number = 120
 Again on decreasing by 10% the number
 $= 120 \times \frac{(100-10)}{100} = 108$
 So, the percentage increase in the number
 $= \frac{108-100}{100} \times 100$
 $= 8\%$ increase

- 100. The price of a residential flat increases by 15% per year. If the present price is ₹ 60,00,000, then what will be the cost after two years?**
 (a) ₹78,00,000 (b) ₹83,45,000
 (c) ₹85,39,500 (d) ₹79,35,000

RRB NTPC 28.03.2016 Shift : 3

Ans : (d) The cost of the flat after two years,

$$= 6000000 \left(1 + \frac{15}{100}\right)^2$$

$$= 6000000 \times \frac{23}{20} \times \frac{23}{20} = 15000 \times 529 = ₹ 79,35,000$$

- 101. Onion's price is increased by 35% in the new government policy. A person should reduce his consumption by which percentage so that his expenditure remains the same?**
 (a) 25% (b) 29%
 (c) 26% (d) 33%

RRB NTPC 16.04.2016 Shift : 3

Ans : (c) Required% reduction in consumption

$$= \frac{R}{100+R} \times 100$$

$$= \frac{35}{100+35} \times 100 = \frac{35}{135} \times 100$$

$$= \frac{7}{27} \times 100 = 25.92 \approx 26\%$$

Type - 6

Problems Based on Investment and Business

- 102. 20% of the toys produced in a factory were defective and 25% of the remaining were damaged. If 4800 toys were in good condition, then what was the original number of toys produced?**
 (a) 9000 (b) 8000
 (c) 6000 (d) 10000

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let, number of toys in factory = x

$$\text{No. of defective toys} = x \times \frac{20}{100} = \frac{x}{5}$$

$$\text{No. of damage toys} = \left(x - \frac{x}{5}\right) \times \frac{25}{100}$$

$$= \frac{4x}{5} \times \frac{1}{4} = \frac{x}{5}$$

According to the question-

$$x - \left(\frac{x}{5} + \frac{x}{5}\right) = 4800$$

$$x - \frac{2x}{5} = 4800$$

$$\frac{3x}{5} = 4800$$

$$x = 8000$$

- 103. Due to 25% reduction in the price of wheat per kg, John is able to buy 5 kg more for ₹600. What is the original price of wheat per kg?**
 (a) ₹50 (b) ₹45 (c) ₹40 (d) ₹60

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (c) : Suppose original price of wheat per kg = ₹ x
 After reduction of 25%,

$$\text{Price of wheat per kg} = x \times \frac{75}{100} = ₹ \frac{3x}{4}$$

According to the question

$$\frac{600}{\frac{3x}{4}} - \frac{600}{x} = 5$$

$$\frac{2400}{3x} - \frac{600}{x} = 5$$

$$\frac{2400 - 1800}{3x} = 5$$

$$\text{or } 15x = 600$$

$$x = ₹ 40 \text{ per kg}$$

- 104. An investor invests 1/2 part of his money at 5%, 1/4 part at 10% and the rest at 8%, after 2 years his income is ₹ 2800 then find the total amount.**

- (a) ₹10000 (b) ₹15000
 (c) ₹20000 (d) ₹12000

RRB NTPC 19.04.2016 Shift : 1

Ans : (c) Let the total amount of the investor is ₹x,

$$\text{Rest part} = x - \left(\frac{x}{2} + \frac{x}{4}\right) = \frac{x}{4}$$

$$\therefore \frac{\frac{x}{2} \times 5 \times 2}{100} + \frac{\frac{x}{4} \times 10 \times 2}{100} + \frac{\frac{x}{4} \times 8 \times 2}{100} = 2800$$

$$\frac{x}{20} + \frac{x}{20} + \frac{x}{25} = 2800$$

$$\frac{5x + 5x + 4x}{100} = 2800$$

$$14x = 280000 \Rightarrow x = ₹20000$$

- 105. Production of sugar was 1584 million kg. in 2001 which was 20% more than 1991. Find the production of sugar in 1991 (in million kg.).**
 (a) 1980 (b) 1280 (c) 1900 (d) 1320

RRB NTPC 12.04.2016 Shift : 1

Ans : (d)

$$\text{Production of sugar in 1991} = \frac{1584}{100+20} \times 100$$

$$= \frac{1584}{120} \times 100 = 1320 \text{ million kg.}$$

106. A drug supervisor rejects 0.05% of medicines as defective medicines. How many medicines will tested to reject 4 medicines?

- (a) 5000 (b) 8000
(c) 6000 (d) 8500

RRB NTPC 22.04.2016 Shift : 1

Ans. (b) : \therefore 100 medicines will tested to reject 0.05% medicines.

\therefore Tested medicines, to reject 1 medicine = $\frac{100}{0.05}$

Then, to reject 4 medicines = $\frac{100}{0.05} \times 4$

$$= \frac{100 \times 400}{5} = 20 \times 400 = 8000$$

Type - 7 Problems Based on Percentage Change in Area

107. In measuring the sides of a rectangle error of 10% and 8% in excess are made. Find the error percent in its area.

- (a) 1.88% (b) 18.8%
(c) 188% (d) 0.188%

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (b) : The error percent in its area = $\pm a \pm b \pm \frac{a \times b}{100}$

$$= 10 + 8 + \frac{10 \times 8}{100} \\ = 18.8\%$$

108. The length of 2 adjacent side of a square are increased by 35% and 25% respectively. As a result, the area of the rectangle will be more than the area of square.

- (a) 68.75% (b) 69.75%
(c) 67.75% (d) 70.75%

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question, the two adjacent sides of the square are increasing by 35% and 25% respectively.

$$= x + y + \frac{x \times y}{100}$$

Let the area of square be 100%

$$\text{Percentage increase} = 35 + 25 + \frac{35 \times 25}{100} \\ = 60 + 8.75 = 68.75$$

The area of rectangle is 68.75% more than the area of the square.

1.09 If the length and breadth of a rectangular plot of land are increased by 10% and 8% respectively then what will be the percentage increase or decrease in its area ?

- (a) 16.8% decrease (b) 18.8% decrease
(c) 16.8% increase (d) 18.8% increase

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (d) : $\left(x + y + \frac{xy}{100} \right) \%$

$$\text{Increase \%} = \left(10 + 8 + \frac{10 \times 8}{100} \right) \\ = 18 + \frac{80}{100} \\ = 18.8\% \text{ increase}$$

110. If the radius of a circle is decreased by 35% then its area decreases by:

- (a) $57\frac{3}{4}\%$ (b) $57\frac{2}{4}\%$
(c) $56\frac{3}{4}\%$ (d) $57\frac{1}{4}\%$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (a) : Let, radius of circle (r) = 100 units

$$\therefore \text{Area of circle} = \pi r^2 = \pi \times 100 \times 100 \\ = \pi 10000$$

Radius of circle when reduced by 35% (R) = 65 units

$$\therefore \text{Area of circle} = \pi R^2 = \pi \times 65 \times 65 \\ = \pi 4225$$

$$\therefore \% \text{ decrease in area} = \frac{\pi(10000 - 4225)}{\pi 10000} \times 100$$

$$= \frac{5775}{100} = 57.75 \%$$

$$= 57\frac{3}{4} \%$$

Hence, there will be a decrease of $57\frac{3}{4}\%$ in the area.

111. If each side of a rectangle is increased by 25%, then its area will increase by:

- (a) $55\frac{1}{4}\%$ (b) $60\frac{1}{4}\%$
(c) $56\frac{1}{4}\%$ (d) $54\frac{1}{4}\%$

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (c) : Area of rectangle = length \times breadth

$$100 \xrightarrow{+25\%} 125 \xrightarrow{+25\%} 156.25$$

Hence, increase in area = $156.25 - 100$

$$= 56.25\%$$

$$= 56\frac{1}{4} \%$$

112. If the radius of a circle is reduced by 25%, its area is reduced by:

- (a) 6.25% (b) 43.75%
(c) 50% (d) 56.25%

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (b) : From question,

$$\text{Required reduction \% in area of circle} = -25 - \\ 25 + \frac{25 \times 25}{100}$$

$$= -50 + 6.25$$

$$= -43.75\%$$

$$= 43.75\%$$

113. Each side of a square is increased by 50% Find the percentage increase in its area.

(a) 150% (b) 25% (c) 125% (d) 50%

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (c) : By given data:-

Increase in side of square = 50%

Percentage increase in area of square = $\left(a + b + \frac{ab}{100}\right)\%$

∴ Percentage increase in area of square

$$= \left(50 + 50 + \frac{50 \times 50}{100}\right)\% = 100 + 25 = 125\%$$

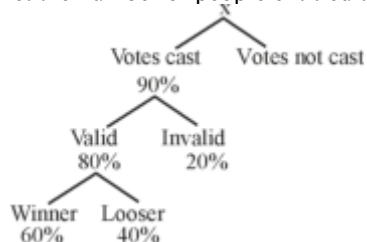
Type - 8 Problems Based on Voting

114. In an election, 90% of those entitled to vote cast their ballot, 80% of the votes cast was valid. The winner got 60% of the valid votes. If the winner got 64800 votes, what was the number of people entitled to vote ?

(a) 150000 (b) 125000
(c) 200000 (d) 175000

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : Let the number of people entitled to vote = x



Then,

According to the question,

$$x \times 90\% \times 80\% \times 60\% = 64800$$

$$x \times \frac{90}{100} \times \frac{80}{100} \times \frac{60}{100} = 64800$$

$$\frac{x \times 9 \times 4 \times 3}{10 \times 5 \times 5} = 64800$$

$$x = \frac{16200000}{108}$$

Hence, the number of people entitled to vote is x = 150000

115. In an election a candidate with 37% votes loses by a difference of 520000 votes to the winning candidate. What is the total number of votes cast in that election with two contestants?

(a) 1500000 (b) 2000000
(c) 2200000 (d) 1700000

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (b) :

Total votes	Losing Candidate	Winning candidate
100%	37%	63%

Difference in the % of votes between the candidates-26%

While actual difference in votes = 520000

Here 26% — 520000

$$1\% \text{ — } \frac{520000}{26} = 20000$$

$$\therefore 100\% - 2000000$$

$$\text{Total votes} = 2000000$$

116. In an election, there were only two candidates. The winning candidate got 48% of the total votes. His opponent got 6800 votes which was 34% of the total votes. Some of the votes were invalid. The winning margin of the candidate who won the election and the number of invalid votes respectively are:

(a) 3000 votes, 3600 votes
(b) 2800 votes, 3600 votes
(c) 3600 votes, 2800 votes
(d) 3200 votes, 3600 votes

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) : Let number of total votes = 100

Votes obtained by winner candidate = 48

Votes obtained by opponent = 34

Invalid votes = 100 - (48 + 34) = 18

Votes received by the opponent = 6800

34 units = 6800

1 unit = 200

Winning margin = 48 - 34 = 14

1 unit = 200

14 units = 2800

Winning votes = 2800

Invalid votes = 18 × 200 = 3600

117. In an election between two candidates, 75% of the voters enrolled in the election to cast their votes, out of which 2% were declared invalid. A candidate got 9261 votes, which were 75% of the valid votes. The total number of voters enrolled in that election were.

(a) 18000 (b) 16400
(c) 16000 (d) 16800

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let total number of voter = x

$$\text{Number of cast votes} = x \times \frac{75}{100} = \frac{75x}{100}$$

$$\text{Valid votes} = \frac{75x}{100} \times \frac{98}{100}$$

According to the question,

$$9261 = \frac{75x}{100} \times \frac{98}{100} \times \frac{75}{100}$$

$$9261 = x \times \frac{3}{4} \times \frac{49}{50} \times \frac{3}{4}$$

$$x = 16800$$

118. In an election, candidate A got 75% of total valid votes. If 15% of total votes were declared invalid and the total number of votes is 560000, then the number of valid votes polled in favour of A is:

(a) 355000 (b) 357000
(c) 356000 (d) 358000

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (b) : The number of valid votes polled in favour of A is

$$= 560000 \times \frac{85}{100} \times \frac{75}{100}$$

$$= 3,57,000$$

119. In an election, there were only two candidates. The losing candidate got 48% of the total votes. His opponent got 6000 votes more and won by a margin of 3% votes. What was the number of invalid votes?

(a) 2000 (b) 3200
(c) 6000 (d) 3000

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let total votes = 100%

Votes obtained by losing candidate = 48%

Votes obtained by winning candidate = 52%

Difference of obtained votes = 52 - 48 = 4%

As per question,

Difference of votes = 3%

It means that 1% votes are illegal/invalid

∴ 3% → 6000

1% (Invalid votes) = 2000

120. District XYZ has 50,000 voters out of them, 20% are urban voters and 80% rural voters. For an election 25% of the rural voters were shifted to the urban area. Out of the voters in both rural and urban areas, 60% are honest, 70% are hardworking and 35% are both honest and hardworking.

Two candidates A and B, contested the election. Candidate B swept the urban vote, while Candidate A found favour with the rural voters. Voters who were both honest and hardworking voted for NOTA. How many votes were polled in favour of candidate A, candidate B and NOTA, respectively?

(a) 19500, 13000 and 17500
(b) 17000, 15500 and 17500
(c) 17875, 14625 and 17500
(d) 19000, 13500 and 17500

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question

Total number of voters in XYZ district = 50,000

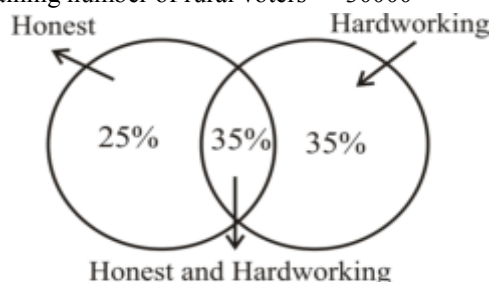
Urban voters = $50000 \times \frac{20}{100} = 10,000$

Rural voters = $(50000 - 10000) = 40,000$

Total number of urban voters (after 25% shift) =

$10000 + 40000 \times \frac{25}{100} = 20000$

Remaining number of rural voters = 30000



∴ Total turnout given in NOTA = $50000 \times \frac{35}{100} = 17500$

∴ A got total votes

= 30000 - NOTA votes pulled in rural

= $30000 - 30000 \times \frac{35}{100}$

= 30000 - 10500

= 19500

∴ B got total votes

= 20000 - NOTA votes pulled in urban

= $20000 - 20000 \times \frac{35}{100}$

= 20000 - 7000 = 13000

121. In an election the votes cast for two candidates were in the ratio 2:9. If the successful candidate received 984321 votes find the total votes polled.

(a) 1203059 (b) 1302059
(c) 1320059 (d) 1230059

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let number of votes obtained by both the candidates in the election be 2x and 9x respectively.

Votes received by the winning candidate = 984321

$9x = 984321$

$x = 109369$

∴ Total number of votes = $11 \times 109369 = 1203059$

Type - 9 Miscellaneous

122. In a school the ratio of the number of boys and girls is 5:6. 20% boys and 25% girls are scholarship holders. How many students did not get a scholarship?

(a) $\left(\frac{950}{11}\right)\%$ (b) $\left(\frac{850}{11}\right)\%$

(c) $\left(\frac{8000}{11}\right)\%$ (d) $\left(\frac{750}{11}\right)\%$

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (b) :

Let the number of boys = 500

And the number of girls = 600

Number of boys, who are not scholarship holder

= $500 \times \frac{80}{100} = 400$

Number of girls, who are not scholarship holder

= $600 \times \frac{75}{100} = 450$

Percentage of students who are not scholarship holder

= $\frac{400 + 450}{1100} \times 100$

= $\left(\frac{850}{11}\right)\%$

123. The ratio of the number of boys to the girls in a school is 3 : 2. If 20% of the boys and 25% of the girls are scholarship holders, find the percentage of those who are NOT scholarship holders.

(a) 78% (b) 87%
(c) 68% (d) 86%

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the number of boys in school = $3x$
And number of girls = $2x$
Total number of students in school = $5x$
Number of students who hold scholarship

$$= 3x \times \frac{20}{100} + 2x \times \frac{25}{100}$$

$$= \frac{110x}{100} = \frac{11x}{10}$$

Number of students who don't hold scholarship

$$= 5x - \frac{11x}{10}$$

$$= \frac{39x}{10}$$

$$\text{Required percentage} = \frac{\frac{39x}{10}}{5x} \times 100$$

$$= \frac{39x \times 100}{10 \times 5x}$$

$$= 78\%$$

124. A shopkeeper cheats to the extent of 10% while buying as well as while selling. While he was eventually caught and punished at what percent was he gaining till then?

(a) 21% (b) 20%
(c) 34% (d) $21\frac{1}{2}\%$

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (a) : From formula, % change = $\left(x + y + \frac{xy}{100}\right)\%$

$$\text{Required percentage} = 10 + 10 + \frac{10 \times 10}{100}$$

$$= 10 + 10 + 1 = 21\%$$

125. The value of a machine depreciates at the rate of 10% per annum. If its present value is 1,62,000. What was the value (in ₹) of the machine 2 years ago?

(a) ₹2,00,000 (b) ₹50,000
(c) ₹54,66,123 (d) ₹1,31,220

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (a) : 2 years ago value of the machine

$$= \frac{162000}{\left(1 - \frac{10}{100}\right)^2}$$

$$= \frac{162000}{9 \times 9} \times 100$$

$$= ₹200000$$

126. The value of a car depreciates at the rate of 20% every year. After two years the value of the car will be ₹4,80,000/-. The original price of the car is.

(a) ₹ 6,00,000/- (b) ₹ 7,50,000/-
(c) ₹ 5,50,300/- (d) ₹ 6,20,000/-

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let original price of the car was ₹x
According to the question,

$$x \times \frac{80}{100} \times \frac{80}{100} = 480000$$

$$x = \frac{480000 \times 100 \times 100}{80 \times 80}$$

Original Price of car $x = ₹7,50,000/-$

127. A shopkeeper divided a sum of ₹250,000 between his three sons in a proportion of 30%, 45% and 25% respectively. How much did each son inherit?

(a) ₹75, 000, ₹1,14,500 and ₹60,500
(b) ₹75,000, ₹1,13,500 and ₹61,500
(c) ₹75,000, ₹1,12,000 and ₹63,000
(d) ₹75,000, ₹1,12,500 and ₹62,500

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (d) : Ratio of amount-

30% : 45% : 25%

6 : 9 : 5

$\therefore (6+9+5) \rightarrow 250000$

20 \rightarrow 250000

1 \rightarrow 12500

\therefore The amount received by the first son = 6×12500
= ₹75,000

The amount received by the second son = 9×12500
= ₹1,12,500

The amount received by the third son = 5×12500
= ₹62,500

128. John won a lottery in which the government deducted 35% of the tax and gave 7/8 part to John and remaining to the ticket seller. If the ticket seller received Rs. 22,343.75. What was the amount of lottery?

(a) 2,23,437 (b) 275,000
(c) 264,384 (d) 178,750

RRB NTPC 28.04.2016 Shift : 1

Ans : (b) Assuming lottery amount = x Rs.

$$\text{Governments tax} = \frac{x \times 35}{100} = \frac{35x}{100}$$

$$\text{Remain amount} = x - \frac{35x}{100} = \frac{65x}{100}$$

$$\text{Share of John} = \frac{65x}{100} \times \frac{7}{8} = \frac{91x}{160}$$

$$\text{Remain amount} = \frac{65x}{100} - \frac{91x}{160} = \frac{520x - 455x}{800} = \frac{65x}{800}$$

$$\therefore \frac{65x}{800} = 22343.75$$

$$x = \frac{22343.75 \times 800}{65} = ₹ 275000$$

Profit & Loss

Type-1 Problems Based on Finding The Percentage of Profit and Loss

1. By selling an item for ₹222 a person incurs a loss of ₹48. What is the percentage of loss incurred in the transaction?

- (a) $17\frac{7}{9}\%$ (b) $21\frac{23}{37}\%$
(c) $16\frac{7}{18}\%$ (d) $18\frac{8}{9}\%$

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (a) : Cost price of the item = $222 + 48 = ₹270$

$$\text{Loss \%} = \frac{48}{270} \times 100 \Rightarrow \frac{160}{9} = 17\frac{7}{9}\%$$

2. The selling price of 32 items is equal to the cost price of 38 items. Find the profit percentage.

- (a) 16.25% (b) 15.79% (c) 18.75% (d) 19.25%

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (c) : Given,

$$32 \times \text{SP} = 38 \times \text{CP}$$

$$\Rightarrow \frac{\text{SP}}{\text{CP}} = \frac{38}{32}$$

$$\text{Hence, } P = 38 - 32 = 6$$

$$\text{Profit \%} = \frac{P \times 100}{\text{CP}}$$

$$= \frac{6 \times 100}{32}$$

$$\therefore P = \frac{75}{4}\% \text{ or } 18.75\%$$

3. The initial profit percentage on the sale of an item was 74%. If the cost price of the item went up by 50%, but the selling price remained the same, what would be the new profit percentage?

- (a) 8% (b) 16% (c) 13% (d) 24%

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (b) :

Let initial cost price of the item (C.P.) = 100

↓ + 74% Profit

Selling price (S.P.) = 174

According to the question,

When CP increase 50%

Cost Price = 150 } 24 Profit

But, Selling price is same = 174

$$\text{New Profit\%} = \frac{24}{150} \times 100 = 16\%$$

4. By selling an article for ₹ 211.20 a trader loses 12%. If he sells it for ₹ 248.40, then his loss gain percent is:

- (a) Loss, 2.5% (b) Loss, 5%
(c) Gain, 5.5% (d) Gain, 3.5%

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (d) : Selling price of an article = ₹ 211.20

$$\text{Cost price of article} = 211.20 \times \frac{100}{88} = ₹ 240$$

Given, Selling price of article = ₹ 248.40

$$\begin{aligned} \text{Profit \%} &= \frac{248.40 - 240}{240} \times 100 \\ &= \frac{8.40}{240} \times 100 = 3.5\% \end{aligned}$$

5. A person sells his goods at 30 % profit. If the cost price increases by 25%, and the selling price increases by 10% then what is his new profit percentage?

- (a) 16.4% (b) 13.5%
(c) 14.4% (d) 15.6%

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (c) : Let the cost price of goods (C.P) = ₹100

$$\therefore \text{Selling price (S.P)} = \frac{100 \times 130}{100} = ₹130$$

Again,

After 25% increase,

$$\begin{aligned} \text{New C.P} &= \frac{100 \times 125}{100} \\ &= ₹125 \end{aligned}$$

After increase,

$$\begin{aligned} \text{New S.P} &= \frac{130 \times 110}{100} \\ &= ₹143 \end{aligned}$$

$$\text{New Profit} = 143 - 125 = ₹18$$

$$\text{New Profit\%} = \frac{\text{Profit}}{\text{C.P}} \times 100$$

$$= \frac{18}{125} \times 100 = 14.4\%$$

6. Atulit buys an old bicycle for Rs. 4,000 and spends Rs. 400 for its repairs. If he sells the bicycle for Rs. 5,000, his percentage gain is:

- (a) $7\frac{13}{12}\%$ (b) $7\frac{13}{11}\%$
(c) $13\frac{1}{11}\%$ (d) $13\frac{7}{11}\%$

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (d) : Cost price of the bicycle for Atulit = 4000 + 400 = ₹4400

Selling price of the bicycle = ₹5000

$$\text{Profit} = 5000 - 4400 = ₹600$$

$$\begin{aligned}\text{Profit \%} &= \frac{600}{4400} \times 100 \\ &= \frac{600}{44} \\ &= \frac{150}{11} \\ &= 13\frac{7}{11}\%\end{aligned}$$

7. The selling price of 9 articles is equal to the cost price of 15 articles. In this transaction there is a:

- (a) loss of 40%
(b) gain of 66.6% nearly
(c) loss of 66.6% nearly
(d) gain of 40%

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question-

$$9 \times \text{SP} = 15 \times \text{CP}$$

$$\frac{\text{SP}}{\text{CP}} = \frac{15}{9}$$

$$\text{SP} > \text{CP}$$

$$\therefore \left(\text{Profit \%} = \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100 \right)$$

$$\begin{aligned}\therefore \text{Profit \%} &= \frac{15 - 9}{9} \times 100 \\ &= \frac{6}{9} \times 100, = \frac{200}{3} \\ &= 66.66\%\end{aligned}$$

8. A retailer buys a bag contains 54 kg oranges at ₹25 per kg. Later upon sorting he finds that 4 kg oranges are rotten, he throws them and sells the remaining ones at ₹36 per kg. Find his profit percent.

- (a) $33\frac{1}{3}\%$ (b) 40%
(c) 25% (d) 30%

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (a) : Given-

Cost price of oranges = 25 ₹/kg

Cost price of 54 kg oranges = $54 \times 25 = ₹1350$

After 4 kg oranges are rotten the remaining oranges = $54 - 4 = 50\text{kg}$

Selling price of the remaining oranges = 36 ₹/kg

Price obtained on selling 50 kg of oranges = $50 \times 36 = ₹1800$

Profit = $1800 - 1350 = ₹450$

$$\begin{aligned}\text{Percentage profit} &= \frac{450 \times 100}{1350} = \frac{3 \times 100}{9} \\ &= 33\frac{1}{3}\%\end{aligned}$$

9.

The ratio of the marked price to the cost price of an article is 5 : 3. If the selling price of that article is ₹3645 and the shopkeeper gave two successive discounts of 25% and 10% on the marked price, then what is the profit or loss percent during this transaction ?

- (a) 12.5% Profit (b) 10% Profit
(c) 15% Loss (d) 15.5% Loss

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (a) : Let marked price = ₹5x

and cost price = ₹3x

On successive discount of 25% and 10% on marked price,

$$\therefore \text{Selling price (SP)} = \frac{90}{100} \times \frac{75}{100} \times 5x$$

$$3645 = \frac{90}{100} \times \frac{75}{100} \times 5x$$

$$x = 1080$$

Cost price (CP) = 3x = ₹3240

$$\begin{aligned}\text{Profit \%} &= \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100 \\ &= \frac{3645 - 3240}{3240} \times 100 = \frac{405}{3240} \times 100 \\ &= 12.5\%\end{aligned}$$

10. A woman buys a car at 24% discount of the printed price and sells it a 20% higher of printed price. Her percentage gain is:

- (a) $7\frac{17}{19}\%$ (b) $57\frac{17}{19}\%$
(c) $57\frac{7}{19}\%$ (d) $5\frac{17}{19}\%$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let the marked price of the car = 100

$$\begin{aligned}\text{Cost price of the car for woman} &= \frac{100 - 24}{100} \times 100 \\ &= 76\end{aligned}$$

$$\begin{aligned}\text{Selling price of the car for woman} &= \frac{100 + 20}{100} \times 100 \\ &= 120\end{aligned}$$

$$\begin{aligned}\text{Hence, profit \%} &= \frac{120 - 76}{76} \times 100 \\ &= \frac{44}{76} \times 100 = 57\frac{17}{19}\%\end{aligned}$$

11. Sabiha purchased 240 cups for her shop at ₹8 each. During transportation, 24 cups got damaged, and she sold the remaining cups at ₹12 each. Find her overall percentage profit.

- (a) 45% (b) 30%
(c) 40% (d) 35%

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (d) : Cost price of 240 cups at the rate of ₹8 per cup = $240 \times 8 = ₹1920$

\therefore 24 cups were damaged

Remaining cups = $240 - 24 = 216$

$$\begin{aligned}\text{Selling price of 216 cups at the rate of ₹12 per cup} &= 216 \times 12 \\ &= ₹2592\end{aligned}$$

$$\therefore \left(P\% = \frac{SP - CP}{CP} \times 100 \right)$$

$$\text{Hence, Profit \%} = \frac{2592 - 1920}{1920} \times 100\%$$

$$= \frac{67200}{1920} = 35\%$$

12. A tradesman marks his goods 25% above the cost price and allows his customers a 12% reduction on their bills. What percentage profit does he make?

- (a) 10% (b) 12.5%
(c) 14% (d) 18%

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (a) : Let, the cost price of goods = ₹100

$$\text{Marked price of goods} = 100 + 100 \times \frac{25}{100}$$

$$= ₹125$$

Selling price of goods after discount = Marked price – 12% discount on marked price

$$= 125 - 125 \times \frac{12}{100}$$

$$= 125 - 15$$

$$= 110$$

$$\text{Hence, profit \%} = \frac{110 - 100}{100} \times 100$$

$$= 10\%$$

13. In selling 33 metres cloth, Rani's profit is equal to the selling price of 11 m cloth, then what is her gain percent?

- (a) 60% gain (b) 30% gain
(c) 50% gain (d) 20% gain

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let SP of 1 meter cloth = ₹1

Then SP of 33 meters cloth = ₹33

CP of 33 meters cloth = (33 – 11) = ₹22

$$CP : SP = CP : SP$$

$$22 : 33 = 2 : 3$$

$$\text{Profit\%} = \frac{1}{2} \times 100 = 50\%$$

14. When a bicycle manufacturer reduced the selling price by 50%, the number of bicycles sold radically increased by 700%. Initially, the manufacturer was getting a profit of 140%. What is the new profit percentage?

- (a) 30% (b) 10% (c) 20% (d) 40%

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the cost price of 1 bicycle = Rs. 100

Initial profit = 140% of 100

$$= \frac{140}{100} \times 100$$

$$= \text{Rs. } 140$$

∴ Selling price = CP + Profit

$$= 100 + 140$$

$$= \text{Rs. } 240$$

New, selling price = 50% of 240

$$= 240 \times \frac{50}{100}$$

$$= \text{Rs. } 120$$

Number of bicycle sold in SP = 1 + 700%

$$= 1 + \frac{700}{100}$$

$$= 8 \text{ units}$$

∴ Net SP = 120 × 8 = 960

Net CP = 100 × 8 = 800

$$\text{New profit\%} = \frac{960 - 800}{800} \times 100 = 20\%$$

15. If the selling price of an article is $\frac{5}{4}$ of its cost price, then the profit percentage obtained in the transaction is:

- (a) 35% (b) 30%
(c) 25% (d) 40%

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (c) : Selling price = $\frac{5}{4} \times$ Cost price

$$\frac{\text{Selling price}}{\text{Cost price}} = \frac{5}{4}$$

Let Selling price = 5k

Cost price = 4k

Profit = 5k – 4k = 1k

$$\text{Profit\%} = \frac{1k}{4k} \times 100 = \boxed{25\%}$$

16. Mahathi purchases a cooker at $\frac{9}{10}$ th of its marked price and sold it for 8% more than its marked price. Find the gain percentage.

- (a) 20% (b) 14%
(c) 10% (d) 16%

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the marked price of cooker = ₹x

$$\text{Then cost price} = x \times \frac{9}{10} = \frac{9x}{10}$$

$$\text{And selling price} = x \times \frac{108}{100}$$

$$= ₹ \frac{27x}{25}$$

$$\text{Profit percentage} = \frac{S.P - C.P}{C.P} \times 100$$

$$= \frac{\frac{27x}{25} - \frac{9x}{10}}{\frac{9x}{10}} \times 100$$

$$= \frac{\frac{270x - 225x}{250}}{\frac{9x}{10}} \times 100$$

$$= \frac{45x \times 10}{250 \times 9x} \times 100$$

$$\text{Profit percentage} = \frac{5}{25} \times 100$$

$$= 20\%$$

17. Vikas buys an old bike for ₹30,000 and spends ₹5,000 on its repairs. If he sells the bike for ₹42,000, his gain percentage.

(a) 20% (b) 18% (c) 17% (d) 19%

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (a) : Total cost price of bike = 30000 + 5000
= ₹ 35000

Selling price = ₹42000

$$\text{Profit \%} = \frac{42000 - 35000}{35000} \times 100$$

$$= \frac{7000}{35000} \times 100$$

$$\text{Profit \%} = \frac{100}{5} = 20\%$$

18. Babu purchased a car for ₹3,00,000/- and a bike for his son for ₹1,00,000/-. He sold the car at a profit of 10% and bike at a loss of 20%. What is the net gain or loss?

(a) 2% profit (b) 1.5% loss
(c) 2.5% loss (d) 2.5% profit

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (d) : CP of the car = ₹300000

CP of the bike = ₹100000

Total CP of car and bike = 300000 + 100000
= ₹400000

On selling the car there is a profit of 10% and on the bike there is a loss of 20%.

$$SP = 300000 \times \frac{110}{100} + 100000 \times \frac{80}{100}$$

$$SP = 330000 + 80000$$

$$SP = 410000$$

$$\text{Profit} = SP - CP = 410000 - 400000$$

$$= ₹10000$$

$$\text{Profit\%} = \frac{\text{Profit}}{\text{Cost price}} \times 100$$

$$= \frac{10000}{400000} \times 100 = 2.5\% \text{ Profit}$$

19. A retailer marks all his goods at 50% above the cost price and thinking that he will still make 25% profit, offers a discount of 25% on the marked price. What is his actual profit on the sales?

(a) 17% (b) 12%
(c) 12.60% (d) 12.50%

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the CP = 100

Marked price (MP) = 150

According to the question,
with 25% discount

$$SP = 150 \times \frac{75}{100}$$

$$SP = 112.5$$

If there is a profit of 25% on the cost price

$$SP = 100 \times \frac{125}{100} = 125$$

$$\text{Percentage of real profit} = \frac{125 - 112.5}{100} \times 100$$

$$= 12.50\%$$

20. A book was sold for ₹230 with a profit of 15%. If it was sold for ₹210, then what would have been the percentage of profit or loss?

(a) 5% loss (b) 4% profit
(c) 4% loss (d) 5% profit

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : SP of Book = ₹ 230

$$CP \text{ of Book} = 230 \times \frac{100}{115}$$

$$= ₹ 200$$

$$\text{Profit percentage of selling at ₹ 210} = \frac{10}{200} \times 100 = 5\%$$

21. The cost price of an article is 75% of the marked price. If a discount of 15% is allowed, then the profit or loss percentage is:

(a) 15% profit (b) 13.33% profit
(c) 15.55% loss (d) 12.44% loss

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : Let the marked price of article = ₹ x

$$\therefore \text{Cost price} = x \times \frac{75}{100} = ₹ \frac{3x}{4}$$

$$\text{Selling price after 15\% discount} = x \times \frac{85}{100} = ₹ \frac{17x}{20}$$

$$\text{Profit \%} = \frac{\frac{17x}{20} - \frac{3x}{4}}{\frac{3x}{4}} \times 100$$

$$= \frac{17x - 15x}{20} \times \frac{4}{3x} \times 100$$

$$= \frac{2x}{5} \times \frac{1}{3x} \times 100$$

$$= \frac{40}{3} \% \text{ or } 13.33\%$$

22. A shopkeeper cheats up to 7% by using under-weight in buying and selling fruits, then his total profit percentage is:

(a) 14.25 (b) 14.49
(c) 14.75 (d) 14.55

RRB NTPC 07.04.2016 Shift : 2

$$\text{Ans : (b) Profit \%} = \left(2x + \frac{x^2}{100} \right) \%$$

$$= 2 \times 7 + \frac{(7)^2}{100}$$

$$= 14 + \frac{49}{100} = 14 + 0.49 = 14.49\%$$

23. The cost price of two varieties of salt T and S is Rs. 25 and 35 per kg respectively are mixed in the ratio of 4:6. The mixed variety is sold at Rs. 37 per kg. What is the profit percentage?

(a) 20% (b) 33%
(c) 25% (d) 38%

RRB NTPC 19.01.2017 Shift : 2

Ans : (a) Cost price of salt T = $25 \times 4 = \text{Rs. } 100$
 Cost price of salt S = $35 \times 6 = 210$
 Total cost price = Rs. 310
 Total selling price = $37 \times 10 = \text{Rs. } 370$
 According to the question-

$$\text{Selling price} = \frac{\text{cost price}(100 \pm P/L)}{100}$$

$$\Rightarrow 370 = \frac{310 \times (100 + P\%)}{100}$$

$$\frac{3700 - 3100}{31} = P\%$$

$$\frac{600}{31} = P\%$$

$$P\% = 19.35\%$$

$$P\% = 20\% \text{ (Approx)}$$

Type - 2 Problems Based on Finding The Cost Price

24. The difference between 12% gain and 4% loss on sale of the item was ₹28. What was the cost price of the item?

- (a) ₹ 175 (b) ₹ 189
 (c) ₹ 196 (d) ₹ 168

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (a) : Given, Profit = 12%, Loss = 4%,
 According to the question,

$$\text{Difference in selling price} = ₹28$$

$$(12\% + 4\%) = 28$$

$$16\% = 28$$

$$\therefore 100\% = \frac{28}{16} \times 100 = 175$$

Hence, Cost price of item = ₹175

25. Sheetal incurred 28% loss by selling an item for ₹207. What was the cost price of the item?

- (a) ₹ 292.50 (b) ₹ 282.50
 (c) ₹ 277.50 (d) ₹ 287.50

RRB NTPC (Stage-2) 16/06/2022 (Shift-II)

Ans. (d) : Let CP of item = 100%

Loss incurred = 28%

$$\therefore (100 - 28) = 72\% \rightarrow 207$$

$$1\% \rightarrow \frac{207}{72}$$

$$100\% \rightarrow \frac{207}{72} \times 100 = ₹ 287.50$$

26. A shopkeeper sells an article at 20% profit. If he had bought the article at 10% less and sold it at ₹18 more than the previous selling price, he would have made 40% profit. What is the original cost price of the article? (in ₹)

- (a) ₹ 350 (b) ₹ 320
 (c) ₹ 300 (d) ₹ 280

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (c) : Let Cost price of the article = ₹x

$$\text{Selling price} = \frac{x \times 120}{100}$$

$$= ₹ \frac{6x}{5}$$

According to the question,

$$\text{Cost price of the article if he bought 10\% less} = \frac{90x}{100}$$

$$= ₹ \frac{9x}{10}$$

$$\text{Selling price} = \frac{6x}{5} + 18$$

$$\text{Again, Selling price} = \text{Cost price} \times \frac{100 + \text{Profit}}{100}$$

$$\frac{6x}{5} + 18 = \frac{9x}{10} \times \frac{100 + 40}{100}$$

$$\frac{6x}{5} + 18 = \frac{9x}{10} \times \frac{140}{100}$$

$$\frac{90 + 6x}{5} = \frac{63x}{50}$$

$$900 + 60x = 63x$$

$$3x = 900$$

$$x = ₹ 300$$

27. By selling an item for ₹2,332 a person incurred a loss of 12%. What was the cost price of the item?

- (a) 2,650 (b) 2,675
 (c) 2,620 (d) 2,625

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : According to the question,

$$88\% \rightarrow ₹2,332$$

$$1\% \rightarrow \frac{2332}{88} \times 1$$

$$100\% \rightarrow \frac{2332 \times 100}{88}$$

Hence Cost Price of the item = ₹2650

28. The profit earned after selling an article for ₹1,875 is the same as the loss occurred after selling the article for ₹1,385. What is the cost price (in ₹) of the article?

- (a) ₹1,360 (b) ₹1,660
 (c) ₹1,630 (d) ₹1,650

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (c) : Let Profit = Loss = ₹ x

$$\Rightarrow 1875 - x = 1385 + x$$

$$\Rightarrow 2x = 1875 - 1385$$

$$\Rightarrow 2x = 490$$

$$\Rightarrow x = 245$$

$$\text{Hence cost price} = 1875 - 245 = ₹ 1630$$

29. An article was sold at a gain of 12%. Had it been sold for ₹ 33 more, the gain would have been 14%. The cost price of the article is:

- (a) ₹ 1750.00 (b) ₹ 1800.00
 (c) ₹ 1650.00 (d) ₹ 1850.00

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (c) : Let the cost price of the article = 100

$$\text{Old selling price} = 100 \times \frac{112}{100} = 112$$

$$\text{New selling price} = 100 \times \frac{114}{100} = 114$$

According to the question,

$$114 - 112 = 33$$

$$2 = 33$$

$$1 = 16.5$$

$$100 = ₹1650$$

Hence, the cost price of article is ₹ 1650

- 30. Anupama sold a book at 10% profit. If she would have sold the book for ₹20 more her profit % would have been 15%. Find the cost price of book?**

- (a) ₹450 (b) ₹400
(c) ₹500 (d) ₹375

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (b) : Let the cost price of book = ₹x

$$\begin{aligned} \text{Selling price} &= x \times \frac{110}{100} \\ &= ₹ \frac{11}{10} x \end{aligned}$$

According to the question,

$$\frac{11x}{10} + 20 = x \times \frac{115}{100}$$

$$\frac{11x}{10} + 20 = \frac{23}{20} x$$

$$\frac{23x}{20} - \frac{11x}{10} = 20$$

$$\frac{23x - 22x}{20} = 20$$

$$x = ₹400$$

Hence, cost price of book is ₹400.

- 31. Qamar sold 18 toys for ₹980, thereby making a loss equal to the cost price of 4 toys. What the cost price of each toy?**

- (a) ₹ 60 (b) ₹ 75
(c) ₹ 70 (d) ₹ 80

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (c) : Selling price of 18 toys = ₹980

Loss = cost price of 4 toys

$$18\text{CP} = 18\text{SP} + 4\text{CP}$$

$$14\text{CP} = 18\text{SP}$$

$$\frac{\text{CP}}{\text{SP}} = \frac{18}{14} = \frac{9}{7}$$

$$\text{or CP of 1 toy} = \frac{9}{7} \text{SP}$$

$$\text{While selling price of 1 toy} = \frac{980}{18}$$

According to the question-

$$\text{Cost price of 1 toy} = \frac{980}{18} \times \frac{9}{7} = ₹70$$

- 32. 5% more is gained by selling a cow for ₹1010 than what is gained by selling it for ₹1000 find the cost price of the cow?**

- (a) 200 (b) 280
(c) 400 (d) 300

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the CP of a cow be x,

According to the question,

$$x \times \frac{5}{100} = 1010 - 1000$$

$$x \times \frac{5}{100} = 10$$

$$x = \frac{10 \times 100}{5}$$

$$x = ₹200$$

- 33. 40% of the goods are sold at 2% loss while the rest of the goods are sold at 4% profit. If there is a total profit of ₹ 250, then the cost price of goods sold is:**

- (a) ₹ 5,625 (b) ₹ 6,525
(c) ₹ 9,000 (d) ₹ 15,625

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (d) : Let the cost price of total goods = 100x

According to the question,

$$\text{Total selling price} = \frac{40x \times (100 - 2)}{100} + \frac{60x(100 + 4)}{100}$$

$$\Rightarrow \frac{40x \times 98 + 60x \times 104}{100} = \frac{3920x + 6240x}{100}$$

$$\Rightarrow \frac{10160x}{100} = 101.6x$$

$$\text{Profit} = 101.6x - 100x = 1.6x$$

$$1.6x = 250$$

$$x = \frac{250}{1.6}$$

$$\text{Now the cost price of goods} = \frac{250}{1.6} \times 100 = ₹ 15625$$

- 34. The difference between 7% profit and 6% loss while selling an item is ₹104. What is the cost price of the item?**

- (a) ₹780 (b) ₹820
(c) ₹800 (d) ₹850

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the cost price of the item = ₹x

According to the question,

$$x \times \frac{107}{100} - x \times \frac{94}{100} = 104$$

$$\frac{13x}{100} = 104$$

$$x = ₹800$$

35. A person sells his table at a profit of $12\frac{1}{2}\%$ and chair at a loss of $8\frac{1}{3}\%$ but on the whole he gains ₹25. On the other hand, if he sells the table at a loss of $8\frac{1}{3}\%$ and the chair at a profit of $12\frac{1}{2}\%$ then he neither gains nor loses. Find the cost price of the table.
- (a) ₹360 (b) ₹350
(c) ₹380 (d) ₹370

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let cost price of table = ₹x
And cost price of chair is ₹y
According to the 1st condition-

$$\frac{25x}{200} - \frac{25y}{300} = 25 \Rightarrow 3x - 2y = 600 \dots\dots(i)$$

According to 2nd condition-

$$\frac{25y}{200} - \frac{25x}{300} = 0 \Rightarrow 3y - 2x = 0 \dots\dots(ii)$$

By equation (i) and (ii)-
 $9x - 4x = 1800$
 $5x = 1800$
 $x = ₹360$ (Hence, cost price of book is ₹360.)

36. An article is sold at a profit of 20%. If both the cost price and selling price are ₹100 less, the profit will be 4% more. Find the cost price.
- (a) ₹800 (b) ₹500
(c) ₹600 (d) ₹700

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the cost price = 100x

100x	→	120x
↓		↓

$$(100x - 100) \times \frac{124}{100} = (120x - 100)$$

According to the question-

$$100(x-1) \times \frac{124}{100} = 120x - 100$$

$$124x - 124 = 120x - 100$$

$$4x = 24$$

$$x = 6$$

Cost price of the article = 100x = 100 × 6 = ₹600

37. A shopkeeper marked the price of a new item as ₹1280. If he gets a profit of 20% even after giving a discount of 10%, then find the cost price of the item.
- (a) ₹1120 (b) ₹960
(c) ₹1000 (d) ₹940

RRB NTPC 04.04.2016 Shift : 3

Ans : (b) Let the cost price of the item = ₹x.
Marked prices = ₹1280, Discount = 10%
Selling price of the item = $1280 \times \frac{100-10}{100} = 1280 \times \frac{90}{100}$

According to the question,
Profit = 20%

$$x = 1280 \times \frac{90}{100} \times \frac{100}{100+20}$$

$$x = 1280 \times \frac{90}{120}$$

$$x = ₹960$$

38. A wholesaler sold a water purifier at a loss of 40%. If the selling price has been increased by ₹125, then wholesaler will get the profit of 10%. What was the cost price of the purifier?
- (a) ₹250 (b) ₹225
(c) ₹275 (d) ₹300

RRB NTPC 18.04.2016 Shift : 1

Ans : (a) Let the cost price of the water purifier is ₹x.
According to the question,-

$$x \times \frac{(100-40)}{100} + 125 = \frac{x \times 110}{100}$$

$$\Rightarrow \frac{60x}{100} + 125 = \frac{110x}{100}$$

$$\Rightarrow \frac{50x}{100} = 125$$

$$\Rightarrow \frac{x}{2} = 125$$

$$\Rightarrow x = 125 \times 2 = 250$$

$$\Rightarrow x = ₹250$$

Type - 3 Problems Based on Finding The Selling Price

39. By selling an item for ₹4125. A gains 10%. At what price (in ₹) should he sell the item in order to gain 18%?
- (a) 4,450 (b) 4,425
(c) 4,400 (d) 4,510

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (b) : Cost price of item = $\frac{\text{Selling price} \times 100}{(100 + \text{profit} \%)}$

$$= \frac{4125 \times 100}{(100 + 10)}$$

$$= \frac{4125 \times 100}{110}$$

Cost price of item = ₹3750

For 18% gain, selling price of item

$$= \frac{\text{Cost price}(100 + \text{profit} \%) }{100}$$

$$= \frac{3750 \times (100 + 18)}{100}$$

$$= \frac{3750 \times 118}{100} = 4425$$

Hence, Selling price of article = ₹4425

40. The selling price of 2 blankets are the same. One of the blanket is sold at $66\frac{2}{3}\%$ profit and the CP of the other blanket is ₹ 400 less than its SP. if the total profit on selling both the blankets is 50% then find the selling price of each blanket.

- (a) ₹ 1510 (b) ₹ 1530
(c) ₹ 1520 (d) ₹ 1500

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) : Let the selling price of each blanket = ₹ x

$$\text{Cost price of 1st blanket} = x \times \frac{100}{\left(100 + \frac{200}{3}\right)} = \frac{3x}{5}$$

$$\text{Cost price of 2nd blanket} = ₹ (x - 400)$$

According to the question,

$$\frac{3x}{5} + (x - 400) = 2x \times \frac{100}{150}$$

$$\Rightarrow \frac{8x - 2000}{5} = \frac{4x}{3}$$

$$\Rightarrow 24x - 6000 = 20x$$

$$\Rightarrow 4x = 6000$$

$$\Rightarrow x = \frac{6000}{4}$$

$$\Rightarrow x = ₹ 1500$$

41. By selling an item for ₹ 1,729 Rohini made a loss of 30%. At what price should she sell the item to make a gain of 16%?

- (a) ₹ 2,856.20 (b) ₹ 2,865.20
(c) ₹ 2,856.50 (d) ₹ 2,866.40

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (b) : According to the question,

$$\text{CP of article} = 1729 \times \frac{100}{70} = ₹ 2470$$

$$\text{SP of the article at 16% profit} = \frac{2470 \times 116}{100} = ₹ 2865.20$$

42. A shopkeeper purchased a machine for ₹70,000 and spent ₹5,000 as overhead expenditure. Had he purchased the machine at 15% less, he would have earned a profit of 15%. What is the selling price of the machine?

- (a) ₹78,175 (b) ₹75,000
(c) ₹74,175 (d) ₹74,000

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (c) : CP of Machine = ₹ 70,000

Extra expenditure = ₹ 5,000

On reducing 15% in the CP of machine

$$\text{SP of machine} = 70,000 \times \frac{85}{100} = 59500$$

According to the question-

$$\text{SP} = (59500 + 5000) \times \frac{115}{100}$$

$$= 64500 \times \frac{115}{100}$$

$$= ₹ 74175$$

43. By selling an article for 1,785, a dealer loses 15%. At what price should he sell the article to gain 15%?

- (a) ₹2,415 (b) ₹1,785 (c) ₹2,100 (d) ₹2,205

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let- Cost price (CP) = ₹x

Selling price (SP) = ₹1785, Loss = 15%

$$\therefore \text{CP} = \frac{85}{100} = 1785$$

$$\text{CP} = \frac{1785 \times 100}{85} = ₹2100$$

If profit is 15% then,

$$\text{CP} \times \frac{115}{100} = \text{SP}$$

$$2100 \times \frac{115}{100} = \text{SP}$$

Hence, SP = ₹2415

44. The difference between a 12.5% profit and a 10.5% loss, while selling an item, is ₹161. What would the selling price of the item be if the intended profit is 19%?

- (a) ₹833 (b) ₹798 (c) ₹817 (d) ₹850

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (a) : Let, Cost price (CP) = ₹ x

$$\text{Selling price at 12.5% profit (SP}_1\text{)} = ₹ x \times \frac{112.5}{100}$$

$$\text{Selling price at 10.5% loss (SP}_2\text{)} = ₹ x \times \frac{89.5}{100}$$

According to the question,

$$\frac{112.5}{100}x - \frac{89.5}{100}x = 161$$

$$23x = 16100$$

$$x = \frac{16100}{23}$$

$$x = ₹700$$

$$\text{Selling price at a profit of 19%} = \text{Cost price} \times \frac{119}{100}$$

$$= 700 \times \frac{119}{100} = ₹833$$

$$\text{Selling price} = ₹833$$

45. A shopkeeper incurred a loss of 10% by selling an item for ₹1,980. At what price (₹ in) should he sell that item to gain 15%?

- (a) ₹2,193 (b) ₹2,475 (c) ₹2,005 (d) ₹2,530

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (d) : Cost price of the article = $\frac{\text{SP} \times 100}{100 - \text{loss}\%}$

$$\text{CP} = \frac{1980 \times 100}{100 - 10} = \frac{1980 \times 100}{90} = ₹2200$$

Now selling the article at 15% profit.

$$\text{Selling price of the article} = \frac{\text{CP} \times (100 + 15)}{100}$$

$$= \frac{2200 \times 115}{100}$$

$$= 22 \times 115$$

$$= ₹2530$$

46. A shopkeeper bought 25 chairs from a manufacturer for ₹37,500 and sold them at a profit equal to the selling price of 5 chairs. Then the SP of one chairs is:
- (a) ₹1,875 (b) ₹1,200
(c) ₹1,500 (d) ₹1,250

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (a) : Let the selling price of each chair is x Rs.

∴ Selling price of 25 chairs = 25x

Profit = Selling price of 5 chairs
= ₹5x

Cost price of 25 chairs = ₹37,500

According to the question,

$$25x - 37500 = 5x$$

$$\Rightarrow 20x = 37500$$

$$\Rightarrow x = \frac{37500}{20}$$

$$\Rightarrow x = ₹1875$$

Hence, the selling price of one chair (x) = ₹1875

47. On selling a product at ₹360, shopkeeper makes a loss of 10%. Find the selling price at which he makes a profit of 30%.
- (a) ₹600 (b) ₹480
(c) ₹520 (d) ₹740

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (c) :

Cost price of the article

$$= \text{Selling price} \times \frac{100}{(100 - \text{Loss } \%)}$$

$$\text{Cost price} = 360 \times \frac{100}{90}$$

$$= 4 \times 100$$

$$\text{Cost price} = ₹400$$

∴ To get 30% profit

$$\text{Selling price of the article} = 400 \times \frac{130}{100} = ₹520$$

48. A man makes 8% profit by selling a washing machine for ₹21600 at what price should he sell this machine to get 20% profit?
- (a) ₹ 28,000 (b) ₹ 23,200
(c) ₹ 26,000 (d) ₹ 24,000

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : Selling price of the washing machine = ₹21600

$$\text{profit} = 8\%$$

$$\text{We know that, Cost price} = \frac{\text{Selling Price}}{(100 + \text{Profit})} \times 100$$

$$= \frac{21600}{108} \times 100$$

$$= ₹ 20,000$$

And the selling price of the article to get 20% profit -

$$= 20,000 \times \frac{100 + 20}{100}$$

$$= ₹ 24,000$$

49. A television manufacturer earns a profit of 10% by selling one TV set for ₹24,750. If the production cost is increased by 15%, then what would be the new selling price of the TV set so as to gain a profit of 15%?

- (a) ₹ 28,756.25 (b) ₹ 27,756.25
(c) ₹ 29,756.25 (d) ₹ 26,756.26

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let Initial price (cost) = 100%

Profit = 10%, Selling price = 110

$$110 = 24750$$

$$1 = \frac{24750}{110}$$

$$100\% = \frac{24750}{110} \times 100$$

$$= 22500$$

Initial price = 22500 (cost price)

∴ The cost price increased by 15%

$$\text{Then, new cost price} = 22500 \times \frac{115}{100} = 25875$$

New selling price of the article -

$$\text{So, } 25875 \times \frac{115}{100} = ₹29756.25$$

50. The cost price of 5kg of wheat and 10 kg of lentil were at ₹ 70 and ₹ 80 per kg respectively. On selling, he gained 10% profit on wheat and 20% profit on lentil. What was the total selling price of all items?

- (a) ₹1,375 (b) ₹1,345
(c) ₹1,400 (d) ₹1,350

RRB NTPC 27.04.2016 Shift : 2

Ans : (b) Given that,

The cost price of 5 kg of wheat = 70 × 5 = 350

The cost price of 10 kg of lentil = 80 × 10 = 800

According to the question,

$$\text{The selling price of all items} = \frac{350 \times 110}{100} + \frac{800 \times 120}{100}$$

$$= 385 + 960 = ₹1345$$

Type - 4

Problems Based on Finding The Amount of Profit and Loss

51. Himani bought a washing machine for ₹8000 and spent ₹500 on its repairs. She sold it at 20% profit with the money she got by selling it, she bought another washing machine and sold it at 10% loss. What is her overall loss / profit?

- (a) Profit ₹640 (b) Loss ₹640
(c) Profit ₹680 (d) Loss ₹600

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (c) : Total Cost Price of first washing machine
= 8000 + 500
= ₹8500

$$\text{Profit on first washing machine} = 8500 \times \frac{20}{100}$$

$$= ₹1700$$

$$\begin{aligned} SP_1 &= CP_1 + \text{Profit} \\ &= 8500 + 1700 \\ &= ₹10200 \end{aligned}$$

$$\begin{aligned} \text{Loss on second washing machine} &= CP_2 \times \frac{10}{100} \\ &= 10200 \times \frac{10}{100} \\ &= ₹1020 \end{aligned}$$

Because, Selling Price of first washing machine (SP_1) = Cost Price of second washing machine (CP_2)

$$\begin{aligned} \therefore SP_2 &= CP_2 - \text{Loss} \\ &= 10200 - 1020 \\ &= ₹9180 \end{aligned}$$

$$\begin{aligned} \text{Overall Profit of Himani} &= SP_2 - CP_1 \\ &= 9180 - 8500 \\ &= ₹680 \end{aligned}$$

52. Arvind bought 120 m cloth for ₹ 15000. He sold 45% of it at a gain of 40%, 25% of it at a loss of 10% and the remaining cloth at the cost price. His profit (in ₹) in the entire transaction is—

- (a) ₹ 4075 (b) ₹ 2325
(c) ₹ 4180 (d) ₹ 2035

RRB NTPC (Stage-II) –16/06/2022 (Shift-I)

Ans. (b) : Cost price of cloth = ₹15000

$$\begin{aligned} \text{Selling price of 45\% part of cloth} &= 15000 \times \frac{45}{100} \times \frac{140}{100} \\ &= ₹9450 \end{aligned}$$

$$\begin{aligned} \text{Selling price of 25\% part} &= 15000 \times \frac{25}{100} \times \frac{90}{100} \\ &= ₹3375 \end{aligned}$$

$$\begin{aligned} \text{Selling price of remaining 30\% part of cloth} &= 15000 \times \frac{30}{100} \times \frac{100}{100} \\ &= ₹4500 \end{aligned}$$

$$\begin{aligned} \text{Profit} &= \text{Selling price} - \text{Cost price} \\ &= (9450 + 3375 + 4500) - 15000 \\ &= 17325 - 15000 \\ &= ₹2325 \end{aligned}$$

53. X purchases a car at ₹150000 and then sold it to Y at a profit of 5%. Y later sold it back to X at a loss of 2%. Find the overall profit or loss for X in the entire transaction.

- (a) X loss ₹4,350 (b) X gain ₹3,150
(c) X gain ₹4,350 (d) X gain ₹4,500

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question, X will sell the car to Y after taking 5% profit

$$= 15,0000 \times \frac{105}{100} = ₹1,57,500$$

Now according to the question Y will sell it back to X at a loss of 2%.

$$= 157500 \times \frac{98}{100} = ₹154350$$

Thus X sells the car to Y for Rs. 157500 and buys it again for ₹ 154350. So the profit for X in the whole transaction is :

$$= 157500 - 154350 = ₹3150$$

54. A motor car worth ₹ 2,00,000/- is sold by Ramu at 5% profit to Rahul. Rahul sells the motor car back to Ramu at 2% loss. Ramu's net profit (in ₹) in complete transaction is:

- (a) ₹ 3,208 (b) ₹ 2,058
(c) ₹ 4,200 (d) ₹ 3,200

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

Price of motor car = ₹ 200000

Selling price of motor car for Ramu

= Cost price of motor car for Rahul

$$= 200000 \times \frac{105}{100} = ₹210000$$

Selling price of motor car for Rahul = Cost price of motor car for Ramu

$$= 210000 \times \frac{98}{100} = ₹205800$$

In the whole transaction profit of Ramu

$$= 210000 - 205800 = ₹4200$$

55. The cost price of a car was ₹1,50,000. It was sold by X at a profit of 5% to Y. It was later sold back to X by Y at a 1% loss. Find X's profit in the entire transaction.

- (a) ₹4000 (b) ₹3,150
(c) ₹4500 (d) ₹1,575

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (d) : Cost price of car = ₹ 1,50,000

X will sell the car to Y after taking 5% profit = ₹ 105% of 1,50,000

$$\begin{aligned} &= 150000 \times \frac{105}{100} \\ &= ₹157500 \end{aligned}$$

Now according to the question Y will sell it back to X at a loss of 1%

$$\begin{aligned} &= \frac{99}{100} \times 157500 \\ &= ₹155925 \end{aligned}$$

Hence profit of X = 157500 – 155925

$$= ₹1575$$

56. An item was sold at a profit of 12.5% for ₹ 2250. What was the amount of profit?

- (a) ₹275 (b) ₹250
(c) ₹225 (d) ₹300

RRB NTPC 05.04.2016 Shift-1

Ans : (b) Given-

Selling price = ₹2250

Profit = 12.5%

$$\therefore \text{Cost price} = \frac{\text{Selling price} \times 100}{(100 + 12.5)}$$

$$= \frac{2250 \times 100}{112.5} = ₹2000$$

$$\begin{aligned} \text{So, the amount of profit} &= \text{Selling price} - \text{Cost price} \\ &= 2250 - 2000 = ₹250 \end{aligned}$$

57. If Reena sells 12 mobile phones for ₹ 1,88,160, whose cost price is ₹ 14056 per phone, then how much total profit he earned?

- (a) ₹19,488 (b) ₹17,621
(c) ₹21,014 (d) ₹18,958

RRB NTPC 29.03.2016 Shift : 1

Ans : (a) The selling price of 12 mobiles = ₹ 188160
The total cost price of 12 mobile phones
= ₹12 × 14056 = 168672
Total profit earned by Reena = 188,160 – 168,672
= ₹ 19,488

58. The MRP of a clock is ₹ 4750 and a discount of 12% is given on its sale. If the shopkeeper has bought it for ₹ 3850 then what will be its profit?

- (a) ₹240 (b) ₹570
(c) ₹900 (d) ₹330

RRB NTPC 28.03.2016 Shift : 2

Ans : (d) MRP = ₹ 4750, Cost price = ₹ 3850
Discount % = 12%
Selling price (SP) = $\frac{\text{MRP} \times (100 - \text{discount \%})}{100}$
$$\text{SP} = \frac{4750 \times (100 - 12)}{100}$$
$$\text{SP} = \frac{4750 \times 88}{100} = 4180$$

Profit = SP – CP = 4180 – 3850 = ₹330

59. Jiva bought an item for ₹ 2500 and sold it at 25% above the cost price and paid ₹ 125 on it. Find the profit is in ₹?

- (a) ₹500 (b) ₹550
(c) ₹475 (d) ₹625

RRB NTPC 18.01.2017 Shift : 2

Ans : (a) [Selling price = Cost price $\times \frac{(100 \pm P/L)}{100}$]
Selling price = $\frac{2500 \times 125}{100} = ₹3125$
Profit = Selling price – (Cost price + Tax)
Profit = 3125 – (2500 + 125)
Profit = 3125 – 2625 = ₹500

Type - 5 Problems Based on Finding The Ratio of Values

60. The difference of selling prices of an item on the basis of profit of 8% and 12% is ₹ 3. The ratio of the selling prices of both the items is:

- (a) 27 : 28 (b) 27 : 29
(c) 29 : 31 (d) 27 : 31

RRB NTPC 17.01.2017 Shift-3

Ans : (a) Let the cost price of the item = ₹ x.

The difference of selling prices = ₹ 3

According to the question,

$$x \times \frac{112}{100} - x \times \frac{108}{100} = 3$$

$$\frac{4x}{100} = 3, \quad x = \frac{300}{4} = 75$$

$$\text{So, the required ratio} = 75 \times \frac{108}{100} : 75 \times \frac{112}{100} \\ = 108 : 112 = 27 : 28$$

61. On selling an item at a profit of 4% and 12%, there is a difference of ₹3 in selling price then, the ratio of the selling price of both the items is:

- (a) 13:14 (b) 13:15
(c) 12:15 (d) 13:53

RRB NTPC 26.04.2016 Shift : 3

Ans : (a) Let the cost price of the item = ₹ x.

The difference of selling prices = ₹ 3

According to the question,,

$$= \frac{112x}{100} - \frac{104x}{100} = 3$$

$$\therefore 8x = 300 \Rightarrow x = \frac{300}{8}$$

$$\text{Ratio of selling price} = \frac{104x}{100} : \frac{112x}{100} \\ = \frac{104}{100} \times \frac{300}{8} : \frac{112}{100} \times \frac{300}{8} \\ = 104 : 112 = 13 : 14$$

Type - 6 Problems Based on Cost/Sale of Two Articles

62. Tony purchases two cars A and B at a total cost of ₹6,50,000. He sells car A at a profit of 20% and car B at a loss of 25% and gets the same selling price for both the cars. What are the purchasing prices of car A and car B respectively?

- (a) ₹2,00,000; ₹4,50,000
(b) ₹4,50,000; ₹2,00,000
(c) ₹3,00,000; ₹3,50,000
(d) ₹2,50,000; ₹4,00,000

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the cost price of A and B be x and (650000 – x) respectively.

∴ He earns 20% profit on car A

Therefore he sold the car A at 1.2 x

And on car B he suffers a loss of 25%

Therefore he sold Car B at 0.75 (650000 – x)

∴ The selling price of A and B is same

$$1.2x = 0.75(650000 - x)$$

$$1.2x = 487,500 - 0.75x$$

$$1.95x = 487,500$$

$$x = \frac{487,500}{1.95}$$

$$x = 250,000$$

Cost price of car A = ₹250,000

And selling price of car B = ₹400000

63. Sarita buys two old Samsung phones and three Mi mobile phones for ₹40200. If she sells the Samsung phones at a 10% profit and the Mi Phones at a 20% profit then her total profit is ₹5640. The cost price of the Mi Phone is:

- (a) ₹5,400 (b) ₹1,200
(c) ₹4,400 (d) ₹5,000

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the cost price of samsung phone = ₹ x
And cost price of Mi phone = ₹ y

According to the question,

$$\text{Total cost price} = 2 \times x + 3 \times y = 40200 \dots\dots\dots(1)$$

$$\begin{aligned} \text{Total selling price} &= \frac{110}{100} \times 2x + \frac{120}{100} \times 3y \\ &= \frac{11x}{5} + \frac{18y}{5} \end{aligned}$$

$$\text{Total profit} = \text{Total selling price} - \text{Total cost price}$$

$$5640 = \frac{11x}{5} + \frac{18y}{5} - (2x + 3y)$$

$$5640 = \frac{x}{5} + \frac{3y}{5}$$

$$x + 3y = 5 \times 5640$$

$$x + 3y = 28200 \dots\dots\dots(2)$$

On multiplying by 2 in equation (2), then subtracting from equation (1),

$$2x + 3y = 40200$$

$$2x + 6y = 56400$$

$$\underline{\quad \quad \quad}$$

$$-3y = -16200$$

$$y = ₹ 5400$$

Total cost price of Mi-phone is ₹5400.

64. A shopkeeper sold two toys for ₹990 each. On first toy he gained 10% and on the second he lost 10%. Find the total percentage gain or loss.

- (a) 10% Loss (b) 10% Gain
(c) 1% Loss (d) 1% Gain

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (c) : Selling price of the toys = 990 + 990
= ₹ 1980

According to the question,

$$\begin{aligned} \text{Cost price of the toys} &= 990 \times \frac{100}{110} + 990 \times \frac{100}{90} \\ &= 900 + 1100 \\ &= ₹2000 \end{aligned}$$

$$\begin{aligned} \text{Loss \%} &= \frac{2000 - 1980}{2000} \times 100 \\ &= \frac{20}{2000} \times 100 = 1\% \end{aligned}$$

65. A business man sold two flats for ₹8,25,000 each. On one he gains 9% while on the other he loses 9%. Then how much is his gain or loss in the whole transaction?

- (a) 0.75% profit (b) 0.81% loss
(c) 0.96% profit (d) 0.18% loss

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (b) : If on selling two articles at the same price there is a loss of x% on one and a profit of x% on the other then the loss percentage in the whole transaction is—

$$\text{Loss\%} = \frac{x^2}{100}$$

Then in the given question the percentage loss in the whole transaction.

$$= \frac{(9)^2}{100} = \frac{81}{100} = 0.81\% \text{ loss}$$

66. A dealer sells a table for ₹ 400 making a profit of 25%. He sells another table at a loss of 10% and on the whole transaction he makes neither profit nor loss. How much (in ₹) did the second table cost for him?

- (a) ₹750 (b) ₹700
(c) ₹800 (d) ₹850

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the cost price of the second table (CP₂) = ₹ x
According to the question—

$$400 - 400 \times \frac{100}{125} = x - x \times \frac{90}{100}$$

$$\therefore 400 + x \times \frac{90}{100} = 400 \times \frac{100}{125} + x$$

$$400 + \frac{9x}{10} = 320 + x$$

$$80 = \frac{x}{10} \Rightarrow \therefore x = ₹ 800$$

67. Ram Kumar bought two LED TV sets for ₹41000. By selling one at a profit of 20% and the other at a loss of 15%, he found that the selling prices of both the TV sets are the same. Find his overall gain or loss.

- (a) ₹ 400 profit (b) ₹ 200 loss
(c) ₹ 200 profit (d) ₹ 400 loss

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let cost price of LED is x.

∴ Cost price of the other LED TV = ₹ (41000 - x)

According to the question

$$x \times \frac{120}{100} = (41000 - x) \times \frac{85}{100}$$

$$\frac{6x}{5} = (41000 - x) \times \frac{17}{20}$$

$$24x = 41000 \times 17 - 17x$$

$$41x = 41000 \times 17$$

$$x = ₹17000$$

$$\text{Total selling price} = 17000 \times \frac{120}{100} + 24000 \times \frac{85}{100}$$

$$= 20400 + 20400$$

$$= ₹ 40800$$

$$\text{Loss} = 41000 - 40800$$

$$= ₹ 200 \text{ loss}$$

Type - 7

Problems Based on Goods Bought and Sold at a Particular Rate

68. A vendor sells 15 lemons for 3 rupees gaining 60%. How many did he buy for a rupee?

(a) 7 (b) 8
(c) 10 (d) 9

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (b) : Selling price of one lemon = $\frac{3}{15} = \frac{1}{5}$

$$\text{Cost price of one lemon} = \frac{100}{160} \times \frac{1}{5} = \frac{1}{8}$$

Hence, he bought 8 lemons for a rupee.

69. A dealer buys 200 quintals of wheat at ₹1,200 per quintal. He spends ₹10,000 on transportation and storage. If he sells the wheat at ₹13 per kg, then the profit percentage of the dealer is:

(a) 1% (b) 3%
(c) 2% (d) 4%

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (d) : \therefore Cost price of wheat
= $1200 \times 200 + 10000 = ₹ 2,50,000$

\therefore Total selling price at ₹13 per kg.
= $13 \times 200 \times 100 = ₹ 2,60,000$

$$\begin{aligned} \text{Profit \%} &= \frac{260000 - 250000}{250000} \times 100 \\ &= \frac{10000}{250000} \times 100 = 4\% \end{aligned}$$

70. Rahim purchased 20 kg of oranges at the rate of ₹45/kg and sold them at the rate of ₹54/kg. During this period 1.5 kg oranges got spoiled. He sold the spoiled oranges at the rate of ₹10/kg. His net gain or loss percent is?

(a) 14% loss (b) 14% gain
(c) $12\frac{2}{3}\%$ gain (d) $12\frac{2}{3}\%$ loss

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (c) : Amount spent by Rahim to buy 20 kg of oranges at the rate of ₹45/kg = $45 \times 20 = ₹900$

Amount received on selling 18.5 kg of oranges at the rate of ₹54/kg = $54 \times 18.5 = 999$

Amount received on selling 1.5 kg of spoiled oranges at the rate of ₹10/kg = $1.5 \times 10 = 15$

Total selling price = $999 + 15 = ₹1014$

Profit = Selling price - Cost price
= $1014 - 900 = ₹114$

$$\text{Profit\%} = \frac{114}{900} \times 100 = \frac{38}{3}\% = 12\frac{2}{3}\%$$

71. A vendor sells 10 oranges for ₹1 and gains 30%. How many oranges did he buy for ₹1?

(a) 11 (b) 7
(c) 13 (d) 9

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given:

Selling price of ten oranges = ₹1

Selling price of one orange = $\frac{1}{10}$

$$\begin{aligned} \text{Cost price of one orange} &= \frac{1}{10} \times \frac{100}{(100+30)} \\ &= \frac{1}{10} \times \frac{100}{130} = \frac{1}{13} \end{aligned}$$

$$\text{Number of oranges bought in one rupee} = \frac{1}{\frac{1}{13}} = 13$$

72. A vendor bought bananas at the rate of 6 for ₹10 and sold them at the rate of 4 for ₹6. What is the percentage gain or loss?

(a) 20% (b) 10%
(c) 90% (d) 30%

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (b) : Cost price of 6 bananas = ₹10

$$\text{Cost of 1 banana} = \frac{10}{6}$$

Selling price of 4 bananas = ₹6

$$\text{Selling price of 1 banana} = \frac{6}{4}$$

Profit/Loss = Selling price - Cost price

$$= \frac{6}{4} - \frac{10}{6} = \frac{18-20}{12} = \frac{-2}{12}$$

$$= -\frac{1}{6} \quad \{\therefore (-)\text{sign denotes loss}\}$$

$$\therefore \text{Loss\%} = \frac{\frac{1}{6}}{\frac{10}{6}} \times 100 = \frac{1}{6} \times \frac{6}{10} \times 100 = 10\%$$

73. A man buys 20 articles for ₹16 and sells them at the rate of ₹1.50 per article. What is his gain in percentage?

(a) 87.5% (b) 86.5%
(c) 85.5% (d) 84.5%

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (a) : From question,

Cost price of 20 articles = ₹16

$$\therefore \text{Cost price of 1 article} = \frac{16}{20} = ₹0.8$$

Given, Selling price of an article = ₹1.50

$$\begin{aligned} \text{Profit} &= \text{Selling price} - \text{Cost price} \\ &= 1.5 - 0.8 \\ &= ₹0.7 \end{aligned}$$

$$\text{Profit \%} = \frac{0.7}{0.8} \times 100\%$$

$$= \frac{7}{8} \times 100\% = 87.5\%$$

74. A man bought a number of apples at 5 for ₹50 and equal number at 6 for ₹50. If he sells them at 11 for ₹100. What would be his percentage profit or loss?

- (a) $\frac{100}{121}\%$ loss (b) $\frac{100}{121}\%$ profit
(c) $\frac{121}{100}\%$ profit (d) $\frac{121}{100}\%$ loss

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (a) : Cost price of 1 apple bought at the rate of 5 in ₹50 = ₹ $\frac{50}{5}$

Cost price of 1 apple bought at rate of 6 in ₹50 = ₹ $\frac{50}{6}$

Cost price of two apples (one rate of 5 + one rate of 6)
= $\frac{50}{5} + \frac{50}{6} = ₹ \frac{55}{3}$

∴ Cost price of 1 apple = $\frac{55}{2 \times 3}$
= ₹ (55/6)

Selling price of 1 apple = ₹ (100/11)

⇒ ∴ Loss% = $\frac{\frac{100}{11} - \frac{55}{6}}{\frac{55}{6}} \times 100 = \frac{605 - 600}{(55/6)} \times 100$

⇒ Loss% = $\frac{100}{121}\%$

75. A man purchased 20 dozen mangoes for ₹1,000. Out of these, 40 mangoes were rotten and could not be sold. At what rate per dozen should he sell the remaining mangoes to make a profit of 30%?

- (a) ₹78 (b) ₹80
(c) ₹72 (d) ₹70

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (a) : Cost price of 20 dozen mangoes = ₹ 1000

20 dozens = 20 × 12 = 240 mangoes

Remaining mangoes = 240 - 40 = 200

Selling price of 1 mango at 30% profit

= $\frac{1000}{200} \times \frac{130}{100} = \frac{13}{2}$

Selling price of 1 dozen mango at 30% profit

= $\frac{13}{2} \times 12 = ₹78$

76. The cost of 2 pencils, 4 pens and 8 erasers is ₹12 and the cost of 8 pens, 10 pencils and 4 erasers is ₹36. What will be the cost of 3 pencils, 3 pens and 3 erasers?

- (a) ₹10 (b) ₹15
(c) ₹12 (d) ₹18

RRB NTPC 02.04.2016 Shift : 3

Ans : (c) Let the cost of One Pencil, One Pen and One Erasers are x, y and z respectively,

According to question

$$2x + 4y + 8z = 12 \dots\dots(i)$$

$$10x + 8y + 4z = 36 \dots\dots(ii)$$

$$12x + 12y + 12z = 48$$

Adding equ. (i) and (ii)

$$x + y + z = 4$$

$$\therefore 3x + 3y + 3z = 4 \times 3 = ₹12$$

77. When 90 chocolates are sold at ₹160 then a chocolate trader suffers a loss of 20%. In order to earn a profit of 20% how many chocolate should be sale at ₹96?

- (a) 45 (b) 36
(c) 54 (d) 28

RRB NTPC 03.04.2016 Shift : 1

Ans : (b) ∴ Selling price of 90 chocolates = ₹ 160

∴ Selling price of 1 chocolate = ₹ $\frac{160}{90} = ₹ \frac{16}{9}$

Cost price of 1 chocolate = $\frac{16}{9} \times \frac{100}{(100 - 20)}$

$$= \frac{16}{9} \times \frac{100}{80} = ₹ \frac{20}{9}$$

Selling price of 1 chocolate in order to earn 20% profit.

$$= \frac{20}{9} \times \frac{100 + 20}{100} = \frac{20}{9} \times \frac{120}{100}$$

Selling price of 1 chocolate = $\frac{8}{3}$

No. of chocolates in ₹1 = $\frac{3}{8}$

∴ No. of chocolate in ₹96 = $96 \times \frac{3}{8} = 36$

78. Vikas buy 5 bananas for ₹4 and sells 4 bananas for ₹5. Find his profit%.

- (a) 55.56% (b) 53.25%
(c) 45.50% (d) 56.25%

RRB NTPC 16.04.2016 Shift : 3

Ans : (d) ∴ Cost price of 5 bananas = ₹4

∴ Cost price of 1 banana = ₹ $\frac{4}{5}$

Selling price of 4 bananas = ₹5

Selling price of 1 banana = ₹ $\frac{5}{4}$

Profit = Selling price - Cost price

$$= \frac{5}{4} - \frac{4}{5} = \frac{25 - 16}{20}$$

$$\text{Profit} = \frac{9}{20}$$

Hence, Profit% = $\frac{9}{20} \times 100 \times \frac{5}{4} = \frac{225}{4} = 56.25\%$

79. A man buy 10 oranges for ₹ 3 and sells 8 for ₹ 3. Calculate his profit percentage?

(a) 20% (b) 25%
(c) 27% (d) 30%

RRB NTPC 27.04.2016 Shift : 3

Ans : (b) Cost price of 1 orange = ₹ $\frac{3}{10}$

Selling price of 1 orange = ₹ $\frac{3}{8}$

$$\begin{aligned}\text{Profit \%} &= \left(\frac{\frac{3}{8} - \frac{3}{10}}{\frac{3}{10}} \times 100 \right) \% \\ &= \left(\frac{\frac{30-24}{80}}{\frac{3}{10}} \times 100 \right) \% \\ &= \left(\frac{6}{80} \times \frac{10}{3} \times 100 \right) \% = 25\%\end{aligned}$$

Type - 8 Miscellaneous

80. Rupert purchases a second-hand TV for Rs. 4,600, spend some money on its repairs, and then sells it for Rs. 5,406, thereby earning a profit of 6%. How much did Rupert spend on the repairs?

(a) ₹600 (b) ₹500
(c) ₹450 (d) ₹400

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question, let the cost to repair TV = ₹x

Cost price of TV = ₹4600 + x

Selling price of TV = ₹5406

$$\begin{aligned}\text{Profit \%} &= \frac{806 - x}{4600 + x} \times 100 \\ 6 &= \frac{806 - x}{4600 + x} \times 100 \\ 27600 + 6x &= 80600 - 100x \\ 106x &= 53000 \\ x &= 500\end{aligned}$$

81. What percentage of profit on cost price equals 20% of profit on selling price?

(a) 28% (b) 30%
(c) 25% (d) 22%

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) :

$$\text{Profit \%} = 20\% = \frac{20}{100} = \frac{1}{5}$$

S.P = 5 Unit

Profit = 1 Unit

C.P = 5 - 1 = 4 Unit

$$\text{Profit \% on cost price} = \frac{1}{4} \times 100 = 25\%$$

82. When the cost price of x articles is equal to selling price of y articles, the profit is 25% then find the ratio of x : y.

(a) 4 : 5 (b) 5 : 4
(c) 5 : 3 (d) 3 : 3

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,
C.P. of x articles (CP) = S.P. of y articles (SP)

$$\frac{SP}{CP} = \frac{x}{y}$$

$$\text{Given, } \frac{SP}{CP} = \frac{125}{100} = \frac{5}{4}$$

$$\text{Hence, } \frac{x}{y} = \frac{5}{4}$$

Hence, ratio of x and y are 5 : 4.

83. Hrithik sells a table at a profit of 37.5%. If he had bought it at 12.5% less and sold it for ₹330 less, he would have gained 10%. The cost price of the table is what percentage less than ₹1000?

(a) 21% (b) 20%
(c) 23% (d) 22%

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) : Let cost price (CP) of the table = ₹x

$$\begin{aligned}\text{Selling Price (SP) of the table} &= \frac{x \times 137.5}{100} \\ &= ₹ \frac{11x}{8}\end{aligned}$$

According to the question,

$$\begin{aligned}\text{Cost price of item on buying 12.5 \% less} &= \frac{x \times 87.5}{100} \\ &= ₹ \frac{7x}{8}\end{aligned}$$

$$\text{New selling price of the table} = \left(\frac{11x}{8} - 330 \right)$$

Again, according to the question,

Profit = SP - CP

$$\left(\frac{11x}{8} - 330 \right) - \frac{7x}{8} = \frac{7x}{8} \times \frac{10}{100}$$

$$\frac{11x - 2640}{8} = \frac{7x}{8} + \frac{7x}{80}$$

$$\frac{11x - 2640}{8} = \frac{70x + 7x}{80}$$

$$110x - 26400 = 70x + 7x$$

$$33x = 26400$$

$$x = ₹ 800$$

Hence,

$$\text{Required \%} = \frac{1000 - 800}{1000} \times 100 = 20\%$$

84. A shopkeeper sold some articles at ₹77/- each and earned a profit of 40%. What would be the selling price of each article if the profit is 6%

(a) ₹59.75 (b) ₹60.40
(c) ₹62.50 (d) ₹58.30

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (d) : Sells an article at the rate of ₹77 each.

Selling price = ₹140% of C.P.

$$140\% = ₹77$$

$$1\% = \frac{77}{140}$$

$$100\% = \frac{77}{140} \times 100$$

$$\text{Cost price} = ₹55$$

Now the article has to be sold for 106% to get 6% profit.

$$100\% = ₹55$$

$$1\% = \frac{55}{100}$$

$$106\% = \frac{55}{100} \times 106$$

$$= ₹58.30$$

The selling price of each article will be ₹58.30

85. If the discount and percentage profit are both 20%, then by what percentage is the marked price above the cost price?

- (a) 50% (b) 40%
(c) 70% (d) 60%

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (a) Given that

$$\text{Discount} = 20\%$$

$$\text{Profit \%} = 20\%$$

Let, marked price = 100

$$\text{Selling Price} = \frac{100 \times 80}{100} = ₹80$$

$$\text{Cost price} = \frac{\text{Selling price} \times 100}{100 + \text{profit}} = \frac{80 \times 100}{120} = ₹\frac{200}{3}$$

Marked price increased relatively to cost price

$$= 100 - \frac{200}{3} = ₹\frac{100}{3}$$

$$\text{Required \%} = \frac{\frac{100}{3}}{\frac{200}{3}} \times 100$$

$$\text{Required \%} = \frac{100 \times 100 \times 3}{3 \times 200} \% = 50\%$$

86. The cost price of 120 pens is the same as the selling price of x pens. If the profit is 25%, then the value of x is:

- (a) 91 (b) 95
(c) 96 (d) 90

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (c) : Cost price of 120 pens = Selling price of x pens

$$\frac{\text{Cost price}}{\text{Selling price}} = \frac{x}{120}$$

$$\text{Profit \%} = \frac{\text{S.P.} - \text{C.P.}}{\text{C.P.}} \times 100$$

$$25 = \frac{120 - x}{x} \times 100$$

$$x = 120 \times 4 - 4x$$

$$5x = 120 \times 4$$

$$x = \frac{120 \times 4}{5}$$

$$x = 96$$

87. John buy four old tractors for ₹2 lacs. He spent total of ₹3 lacs in maintenance and repairing. If he already sells one tractor out of four tractors for ₹1 lacs, then in order to get total 40% profit, what will be the average selling price of the all remaining 3 tractors?

- (a) ₹ 1.5 lacs (b) ₹ 1.2 lacs
(c) ₹ 2 lacs (d) ₹ 2.3 lacs

RRB NTPC 19.04.2016 Shift : 3

Ans : (c) Total cost price of all 4 tractors = 2 + 3 = ₹5 lacs

To earn 40% profit, the selling price of the tractor

$$= \frac{5 \times 140}{100} = ₹7 \text{ lacs}$$

∴ One tractor is sold for ₹1 lacs

∴ Average selling price of remaining the tractors

$$= \frac{7 - 1}{3} = ₹2 \text{ lacs}$$

88. Which of these deals will be the best in terms of percentage profits

- (a) Cost price = 60, Profit = Rs. 32
(b) Cost price = 80, Profit = Rs. 44
(c) Cost price = 50, Profit = Rs. 26
(d) Cost price = 70, Profit = Rs. 40

RRB NTPC 18.01.2017 Shift : 3

Ans : (d) From the option-

$$(a) P\% = \frac{32 \times 100}{60} = 53.33\%$$

$$(b) P\% = \frac{44 \times 100}{80} = 55\%$$

$$(c) P\% = \frac{26 \times 100}{50} = 52\%$$

$$(d) P\% = \frac{40 \times 100}{70} = 57.14\%$$

So, option (d) will be the best deal.

89. A laptop costs ₹27000. You will have to pay 15% extra to purchase an extended warranty of 2 years. What will be the final cost of the laptop if 6% GST must be paid on the whole amount ?

- (a) ₹32,913 (b) ₹31,050
(c) ₹31,293 (d) ₹32,670

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (a) : Laptop final price (with 6% GST)

$$= 27000 \times \frac{115}{100} \times \frac{106}{100}$$

$$= ₹ 32913$$

Discount

1. If the selling price of an article is 3 times the discount offered and if the percentage of the discount is equal to the percentage profit, find the ratio of the discount offered to the cost price.

(a) 7 : 12 (b) 7 : 6
(c) 5 : 12 (d) 7 : 11

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the discount offered on an article = 100
Selling price (SP) = 300
Marked price (MP) = 400
$$\text{Discount\%} = \frac{100}{400} \times 100 = 25\%$$

Hence profit% = 25%
$$\text{Cost price (CP)} = 300 \times \frac{100}{125} = 240 \left(\text{CP} = \frac{\text{SP} \times 100}{100 + d\%} \right)$$

 $\therefore \text{Discount : Cost price} = 100 : 240 = 5 : 12$

2. To gain 25% after announcing a discount of 10%, the shopkeeper must mark the price of the article with cost price ₹ 360 as?

(a) ₹460 (b) ₹486
(c) ₹500 (d) ₹450

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the marked price of the article = ₹x
Cost price of the article = ₹360
According to the question-
$$\text{CP} = \frac{\text{MP}(100 - D\%)}{100 + \text{Profit\%}}$$

$$360 = \frac{x \times (100 - 10)}{(100 + 25)}$$

$$x = \frac{360 \times 125}{90}$$

$$x = ₹500$$

 $\therefore \text{Marked price of the article} = ₹500$

3. Ramu purchased a TV set with an additional 15% discount on the reduced price after deducting 25% discount on the labeled price. If the labeled price was ₹12,000, at what price did he purchase the TV set?

(a) ₹7650 (b) ₹7560
(c) ₹7000 (d) ₹7600

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (a) : Required cost price = The discount on marked price will eventually be equal to selling price.
$$₹12000 \times \frac{75}{100} \times \frac{85}{100} = ₹7650$$

4. Big Mart is offering 5% discount on card payment. How much percentage above cost price should the marked price be so as to make a profit of 10%?

(a) $15\frac{5}{19}\%$ (b) $14\frac{16}{19}\%$
(c) $16\frac{14}{19}\%$ (d) $15\frac{15}{19}\%$

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the cost price (CP) = 100

Given, Discount = 5%, Profit = 10%

We know that

$$\frac{\text{Marked price}}{\text{Cost price}} = \frac{100 + \text{Profit\%}}{100 - \text{Discount\%}}$$

$$\frac{\text{Marked price}}{100} = \frac{100 + 10}{100 - 5}$$

$$\text{Marked price} = \frac{110 \times 100}{95} = \frac{2200}{19} = 115\frac{15}{19}$$

Profit = Marked price - Cost price

$$= 115\frac{15}{19} - 100$$

$$= \frac{2200 - 1900}{19}$$

$$\text{Profit} = \frac{300}{19}$$

$$\text{Profit \%} = \frac{\frac{300}{19}}{100} \times 100 = 15\frac{15}{19}\%$$

5. If a painting was sold for ₹5,225 after a discount of 5%, then what is the marked price of the painting?

(a) ₹5,550 (b) ₹5,500
(c) ₹5,200 (d) ₹5,575

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (b) : We know that, $\text{MP} = \frac{100 \times \text{SP}}{(100 - D\%)}$

$$\begin{aligned} \text{Marked price of painting} &= \frac{5225 \times 100}{95} \\ &= 55 \times 100 \\ &= ₹5500 \end{aligned}$$

6. The cost price of 12 oranges is equal to the selling price of 9 oranges and the discount offered on 10 oranges is equal to the profit earned on 5 oranges. Find the discount percentage (up to 2 digits after the decimal)?

(a) 33.33% (b) 44.44%
(c) 11.11% (d) 16.67%

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$12CP = 9SP$$

$$\frac{CP}{SP} = \frac{9}{12} = \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$$

$$10 \text{ Discount} = 5 \text{ Profit}$$

$$\frac{\text{Discount}}{\text{Profit}} = \frac{5}{10} = \frac{1}{2}$$

$$CP : SP = 6 : 8 \text{ \& D : P = 1 : 2}$$

$$\text{Let the cost price} = ₹6x$$

$$\text{and selling price} = ₹8x$$

$$\text{Profit} = \text{Selling price} - \text{Cost price}$$

$$\text{Profit} = 8x - 6x = 2x$$

$$\text{Then, Discount} = x \left[\because \frac{D}{P} = \frac{1}{2} \right]$$

$$\text{Marked price} = 8x + x = ₹9x \text{ (MP = SP + D)}$$

$$\text{Discount\%} = \frac{x}{9x} \times 100 \left(\text{Discount\%} = \frac{D}{MP} \times 100 \right)$$

$$= 11.11\%$$

7. A salesman offers 20% additional discount, after offering an initial discount of 25% on the labelled rate of a laptop. If the final sale price of the laptop is ₹18,000, then what was its labelled rate?

- (a) ₹ 35,000 (b) ₹ 40,000
(c) ₹ 30,000 (d) ₹ 28,000

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let marked price is ₹x.

According to the question,

$$x \times \frac{75}{100} \times \frac{80}{100} = 18000$$

$$x = ₹30,000$$

8. A dealer marks his goods 20% above the cost price. Then he allows a discount in it makes a profit of 8%. find the rate of discount offered by the dealer?

- (a) 12% (b) 4%
(c) 10% (d) 6%

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (c) :

$$\frac{MP}{CP} = \frac{100 + P}{100 - D}$$

$$\frac{120}{100} = \frac{100 + 8}{100 - D}$$

$$\frac{6}{5} = \frac{108}{100 - D}$$

$$600 - 6D = 540$$

$$6D = 60$$

$$D = 10\%$$

9. The original price of a TV set is ₹9000. The price is discounted by 20% and then raised by 10%. What is its new price?

- (a) ₹9,000 (b) ₹9,920
(c) ₹7,920 (d) ₹7,900

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (c) : Original price of TV = ₹9000

$$\text{After 20\% discount, price of TV} = 9000 \times \frac{80}{100} = ₹7200$$

$$\text{After raised by 10\%, price of TV} = \frac{7200 \times 110}{100} = ₹7920$$

$$\text{Hence, new price of TV} = ₹7920$$

10. Rahul bought a sweater at a discount of 25% and saved Rs. 200. What was the cost of the sweater before the discount was given?

- (a) ₹650 (b) ₹400
(c) ₹800 (d) ₹600

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the cost of the sweater before the discount is given = ₹ x

According to the question,

$$x \times \frac{25}{100} = 200$$

$$x = ₹ 800$$

11. A company offers 5% discount on cash purchases. How much would Darshan pay in cash for a bike purchased from the company, if the market price is ₹75,200?

- (a) ₹ 74,000 (b) ₹ 70,450
(c) ₹ 72,540 (d) ₹ 71,440

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given, Discount = 5%

$$\text{Market price (MP)} = ₹75200$$

$$\text{Selling Price} = \frac{MP \times (100 - D\%)}{100}$$

$$\text{Selling price (SP)} = 75200 \times \frac{95}{100}$$

$$= ₹71440$$

$$\text{Hence, Amount paid by Darshan} = ₹71440$$

12. A shopkeeper gives 20% discount on MRP. Joginder buys a suitcase from the shop, at an additional discount of 20% on the reduced price. If the MRP of the suitcase is ₹1,200, then find the purchasing price paid by Joginder.

- (a) ₹ 864 (b) ₹ 768
(c) ₹ 800 (d) ₹ 600

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (b) : Purchasing price of suitcase

$$= 1200 \times \frac{(100 - 20)}{100} \times \frac{(100 - 20)}{100}$$

$$= 1200 \times \frac{80}{100} \times \frac{80}{100}$$

$$= 12 \times 64$$

$$= ₹ 768$$

13. A shopkeeper marks his goods at a price so that allowing a discount of 20%, he still makes a profit of 8%. Find the marked price of an article which costs him ₹500.

- (a) ₹765 (b) ₹875
(c) ₹575 (d) ₹675

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (d) : Given- Cost price = ₹ 500

Discount = 20%

Profit = 8%

$$\frac{\text{Marked price}}{\text{Cost price}} = \frac{100 + \text{Profit}\%}{100 - \text{Discount}\%}$$

$$\frac{\text{Marked price}}{500} = \frac{100 + 8}{100 - 20}$$

$$\text{Marked price} = \frac{108}{80} \times 500$$

$$\text{Marked price} = ₹ 675$$

- 14. Two devices whose cost price are ₹15000 and ₹20000 respectively, discounts of 8% and 12% are allowed on them respectively. Find the total selling price?**

- (a) ₹ 30,200 (b) ₹ 28,600
(c) ₹ 31,400 (d) ₹ 31,800

RRB NTPC 26.04.2016 Shift : 1

Ans : (c) Cost price of first device = ₹15000

Discount = 8%

$$\left[\text{Selling price} = \frac{\text{Cost price} \times (100 - \text{Discount})}{100} \right]$$

$$\begin{aligned} \text{Selling price} &= \frac{15000 \times (100 - 8)}{100} \\ &= \frac{15000 \times 92}{100} = 150 \times 92 \end{aligned}$$

Selling price of first device = ₹13,800

Cost price of second device = ₹20,000

Discount = 12%

$$\text{Selling price} = \frac{20000 \times (100 - 12)}{100} = 200 \times 88$$

Selling price of second device = ₹17,600

Total selling price = 13,800 + 17,600 = ₹31,400

- 15. _____ is a single discount equivalent to 25%, 20% and 10% successive discounts?**

- (a) 40% (b) 46%
(c) 50% (d) 54%

RRB NTPC 03.04.2016 Shift : 3

Ans : (b)

$$\text{Discount} = 100 \times \frac{75}{100} \times \frac{80}{100} \times \frac{90}{100} = 54\%$$

$$\text{Equivalent discount} = 100 - 54 = 46\%$$

- 16. After giving 20% discount on marked price, Kishore earns a profit of 12%. How much is the marked price more than the cost price?**

- (a) 40% (b) 32%
(c) 25% (d) 8%

RRB NTPC 29.03.2016 Shift : 1

Ans : (a) Let marked price is ₹100.

$$\therefore \text{Selling price} = 100 \times \frac{100 - 20}{100} = 80$$

$$\text{Cost price of an article} = 80 \times \frac{100}{100 + 12} = 80 \times \frac{100}{112}$$

$$= \frac{5 \times 100}{7} = \frac{500}{7}$$

$$\text{Marked price} - \text{Cost price} = 100 - \frac{500}{7} = \frac{200}{7}$$

$$\text{Required \%} = \frac{\frac{200}{7}}{\frac{500}{7}} \times 100 = \frac{200}{500} \times 100 = 40\%$$

- 17. An article was sold for ₹3600 at a discount of 10%. Find the selling price if the discount was 15%?**

- (a) ₹3,600 (b) ₹4,000
(c) ₹3,800 (d) ₹3,400

RRB NTPC 05.04.2016 Shift : 3

Ans : (d) Let selling price of an article = ₹x

$$\text{Selling price after the discount of 10\%} = x \times \frac{90}{100}$$

$$3600 = x \times \frac{90}{100}$$

$$x = ₹4000$$

Selling price after the discount of 15%

$$= 4000 \times \frac{85}{100} = ₹3400$$

- 18. A trader marks his goods 20% above the cost price. If he gives a discount of 5% what will be the percentage of the final profit received?**

- (a) 12% (b) 14%
(c) 15% (d) 18%

RRB NTPC 03.04.2016 Shift : 1

Ans : (b) Let the cost price = ₹100

$$\text{Selling price} = 100 \times \left(\frac{100 + 20}{100} \right) \times \left(\frac{100 - 5}{100} \right)$$

$$= 100 \times \frac{120}{100} \times \frac{95}{100} = ₹114$$

Profit = S.P. - C.P

$$= ₹114 - ₹100 = ₹14$$

$$\text{Profit\%} = \left(\frac{14}{100} \times 100 \right) \% = 14\%$$

$$\text{Trick: (Profit/Loss)\%} = \pm x \pm y \pm \frac{xy}{100} \left[\begin{array}{l} + \rightarrow \text{increase} \\ - \rightarrow \text{decrease} \end{array} \right]$$

$$= +20 - 5 + \frac{20 \times (-5)}{100}$$

$$= +20 - 5 - 1$$

$$\text{Profit} = 14\%$$

19. Find the discount (in percentage) if a book marked at ₹90 is sold for ₹76.

- (a) 14.65% (b) 15.56%
(c) 13.45% (d) 14.75%

RRB NTPC 18.01.2017 Shift : 1

$$\text{Ans : (b) Discount \%} = \frac{90 - 76}{90} \times 100$$

$$= \frac{14}{90} \times 100$$

$$= \frac{140}{9} = 15.56\%$$

20. Manish bought a mobile phone and got 50% discount on the marked price and sold it for ₹8100 at a profit of 35% of his cost price. What was the marked price?

- (a) ₹8000 (b) ₹12000
(c) ₹100000 (d) ₹9000

RRB NTPC 19.04.2016 Shift : 1

Ans : (b) Let the marked price of mobile phone = ₹x

$$\text{Cost price of mobile phone for Manish} = x \times \frac{50}{100} = ₹ \frac{x}{2}$$

$$\therefore \text{Selling price} = \left(\frac{100 + 35}{100} \right) \times \frac{x}{2}$$

$$8100 = \frac{135}{100} \times \frac{x}{2}$$

$$x = \frac{8100 \times 100 \times 2}{135} = ₹12000$$

21. What is the maximum percentage of discount that sheela can give to her customers on the marked price 50 that she has neither profit nor loss on selling her goods, if she has already marked her product by 25% more than the cost price?

- (a) 25% (b) 20%
(c) 30% (d) 40%

RRB NTPC 19.04.2016 Shift : 2

Ans : (b) Let the cost price = ₹100

∴ Marked price = ₹125

∴ (neither profit, nor loss) In this case the discount given on selling price for selling goods is x%.

According to the question,

$$125 \times \frac{(100 - x)}{100} = 100$$

$$(100 - x) = \frac{100 \times 100}{125}$$

$$\Rightarrow 100 - x = 80$$

$$\Rightarrow x = 100 - 80$$

$$\Rightarrow x = 20\%$$

22. Even offer giving 40% discount on the marked price, a jacket sold for ₹600 at 20% profit. If it is sold at marked price, what will be the profit percent?

- (a) 50% (b) 75%
(c) 100% (d) 125%

RRB NTPC 18.04.2016 Shift : 2

$$\text{Ans : (c) } MP \times \left(\frac{100 - \text{discount}\%}{100} \right) = SP$$

$$MP \times \frac{60}{100} = 600$$

$$MP = \frac{600 \times 100}{60}$$

$$MP = ₹1000$$

$$CP = SP \times \frac{100}{100 + 20}$$

$$CP = 600 \times \frac{100}{120}$$

$$CP = ₹500$$

If it is sold at marked price

$$\text{Profit} = 1000 - 500 = 500$$

$$\text{Profit}\% = \frac{500}{500} \times 100 = 100\%$$

23. Ram Naresh buys a bag, whose marked price is ₹400, he buys it for ₹160 after two consecutive discounts. If the second discount is 20%, find the first discount?

- (a) 40% (b) 30%
(c) 50% (d) 80%

RRB NTPC 16.04.2016 Shift : 1

Ans : (c) Let the first discount = $D_1\%$

According to the question,

$$400 \times \left(\frac{100 - D_1}{100} \right) \left(\frac{100 - D_2}{100} \right) = 160$$

$$\Rightarrow 400 \left(\frac{100 - D_1}{100} \right) \times \left(\frac{100 - 20}{100} \right) = 160$$

$$\Rightarrow (100 - D_1) = \frac{160 \times 100 \times 100}{400 \times 80}$$

$$\Rightarrow (100 - D_1) = 50$$

$$D_1 = 100 - 50 = 50\%$$

Hence, the first discount = 50%

24. Aparna changes the marked price of an item to 50% above its cost price. What % of discount is allowed (approximately) to gain 10%?

- (a) 27% (b) 25%
(c) 35% (d) 37%

RRB NTPC 12.04.2016 Shift : 3

Ans : (a) Let the cost price of an item = ₹100
 \therefore Marked price = ₹150
 And selling price on 10% profit = ₹110
 \therefore Discount %

$$\Rightarrow 150 \times \frac{(100 - D)}{100} = 110$$

$$\Rightarrow (100 - D) = \frac{110 \times 100}{150}$$

$$\Rightarrow 100 - D = \frac{220}{3}$$

$$\Rightarrow D = 100 - \frac{220}{3}$$

$$\Rightarrow D = \frac{300 - 220}{3}$$

$$\Rightarrow D = \frac{80}{3} = 26.66$$

$$\Rightarrow D \approx 27\% \text{ (Approx)}$$

25. A trader marked 50% higher price on an item and later gave 20% discount on it. What percentage of profit did the merchant get after giving a discount?

- (a) 30% (b) 125%
 (c) 25% (d) 20%

RRB NTPC 09.04.2016 Shift : 3

Ans : (d) Let the cost price of an item = ₹100

Then the marked price = $100 \times \frac{150}{100} = ₹150$

Selling price = $150 \times \frac{80}{100} = ₹120$

Hence, the required profit percent

$$= \frac{120 - 100}{100} \times 100 = 20\%$$

26. The marked prices of large and small note books are ₹15 and ₹10 respectively. A student bought 5 dozen small and 10 dozen large note books at a total discount of 5%. Find the total discount amount.

- (a) ₹100 (b) ₹110
 (c) ₹120 (d) ₹130

RRB NTPC 06.04.2016 Shift : 2

Ans : (c)

Total price of small note books = $5 \times 12 \times 10 = ₹600$

Total price of large note books = $10 \times 12 \times 15 = ₹1800$

\therefore Amount of discount = $(600 + 1800) \times \frac{5}{100}$

$$= 2400 \times \frac{5}{100} = ₹120$$

27. A box of 20 items was purchased after a discount of 20% at ₹6400. What is the price of each item?

- (a) ₹300 (b) ₹350
 (c) ₹400 (d) ₹450

RRB NTPC 27.04.2016 Shift : 2

Ans : (c)

Cost price of one item = $\frac{6400}{20} = ₹320$

Marked price of one item = $\frac{320 \times 100}{80} = ₹400$

28. Charlie buys a bed after a discount of 22% for ₹16725. He later finds that the same store was selling that bed online for ₹15685 after a 15% discount. What is the difference between marked price of store bed and marked price of online bed? (Rounded off to nearest ₹)?

- (a) ₹2989 (b) ₹2785
 (c) ₹2897 (d) ₹2888

RRB NTPC 28.04.2016 Shift : 1

Ans : (a) Marked price of bed bought from store

$$= 16,725 \times \frac{100}{100 - 22}$$

$$= 16,725 \times \frac{100}{78}$$

$$= ₹21442.30$$

Marked price of bed bought from online

$$= 15,685 \times \frac{100}{100 - 15}$$

$$= 15,685 \times \frac{100}{85}$$

$$= ₹18452.94$$

Required difference = $21442.30 - 18452.94$

$$= 2989.36 = ₹2989$$

29. A saree is sold for ₹5871 after a discount of 5%. Find its marked price?

- (a) ₹5577
 (b) ₹6880
 (c) ₹6180
 (d) ₹5734

RRB NTPC 28.04.2016 Shift : 1

Ans : (c) We know that,

$$\text{Marked Price} = \left(\frac{\text{Selling Price} \times 100}{100 - \text{discount}\%} \right)$$

$$\text{Marked price of saree} = 5871 \times \frac{100}{100 - 5}$$

$$= 5871 \times \frac{100}{95} = ₹6180$$

30. A shopkeeper buys a stereo system of marked ₹2000 at successive discount of 10% and 15% respectively. He spent ₹70 on the packaging and sold it for ₹2000. Find the percentage profit of the shopkeeper.

- (a) Not profit (b) 25%
 (c) 30% (d) 35%

RRB NTPC 29.04.2016 Shift : 2

Ans : (b) Cost price of stereo system for shopkeeper

$$= \frac{2000 \times (100 - 10)}{100} \times \left(\frac{100 - 15}{100} \right)$$

$$= 2000 \times \frac{90}{100} \times \frac{85}{100}$$

$$= ₹1530$$

Total expense = $1530 + 70 = 1600$

Profit = $2000 - 1600 = 400$

$$\text{Profit \%} = \frac{\text{Profit} \times 100}{\text{Cost price}} = \frac{400 \times 100}{1600} = 25\%$$

Ratio & Proportion

Type - 1 Problems Based on The Basic Concept of Ratio and Proportion

1. 64 students of Class 10 took part in a mathematics quiz. If the number of girls was 16 more than the number of boys, then find the ratio of the number of boys to the total number of students who took part in the quiz.

(a) 4 : 9 (b) 3 : 5 (c) 3 : 8 (d) 5 : 8

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (c) : Let, Number of boys = x
And, Number of girls = (x+16)
 $\therefore x + x + 16 = 64$
 $2x = 48$
 $x = 24$

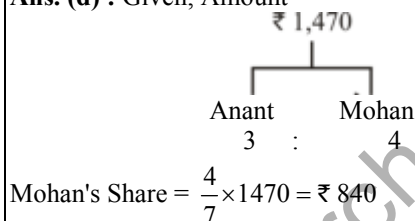
$$\text{Required Ratio} = \frac{24}{(24 + 40)} = \frac{3}{8}$$

2. An amount of ₹ 1,470 is shared between Anant and Mohan in the ratio 3:4. What is the amount received by Mohan?

(a) ₹ 1,050 (b) ₹ 630
(c) ₹ 1,650 (d) ₹ 840

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (d) : Given, Amount



3. x and y are in direct proportion and $y = 92.5$ when $x = 37$. What will be the value of y when $x = 16$?

(a) 32 (b) 40
(c) 48 (d) 24

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (b) : $k = \frac{x}{y} = \frac{37}{92.5} = \frac{1}{2.5}$
But $x = 16$
 $\therefore \frac{16}{y} = \frac{1}{2.5}$
 $y = 40$

4. A pole is 405 m long. It is painted in saffron, white and green colour one above the other in the ratio 8:9:10 respectively. What is the length of the white part of the pole (in meters)?

(a) 130 m (b) 120 m
(c) 140 m (d) 135 m

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (d) : Length of white part of the pole

$$= \frac{\text{Total length of pole}}{\text{Sum of ratio of pole}} \times \text{Ratio of white paint}$$

$$= \frac{405}{8+9+10} \times 9$$

$$= \frac{405}{27} \times 9$$

$$= 135 \text{ meters}$$

5. A sum of ₹x is divided among A, B and C such that the ratio of their shares is 2:3:5. If the positive difference between the shares of B and C is ₹5,940, then what is the value of x?

(a) ₹ 22,680 (b) ₹ 23,220
(c) ₹ 25,920 (d) ₹ 29,700

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (d) : Let the shares of A, B and C are 2n, 3n and 5n respectively

The positive difference between B and C

$$= 5n - 3n = 2n$$

According to the question,

$$2n = 5940$$

$$n = \frac{5940}{2}$$

$$= 2970$$

Value of x = $2n + 3n + 5n$

$$= 10n$$

$$= 10 \times 2970$$

$$= ₹ 29700$$

6. If A is 80% more than B and B is 20% less than C, then what will be the value of A : B : C?

(a) 36 : 25 : 20 (b) 36 : 20 : 25
(c) 36 : 5 : 20 (d) 20 : 25 : 36

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (b) : \therefore B is 20% less than C,

Let, $C \rightarrow 100$

$B \rightarrow 80$

A is 80% more than B,

$$\therefore A \rightarrow 80 \times \frac{180}{100}$$

$$\rightarrow 144$$

$$A : B : C = 144 : 80 : 100$$

On dividing by 4,

$$A : B : C = 36 : 20 : 25$$

7. Seats for Mathematics, Physics and Chemistry in a school are in the ratio of 7:8:9. There is a proposal to increase the seats by 30%, 40% and 50% respectively. What will be the ratio of increased seats?

(a) 91 : 112 : 135 (b) 135 : 112 : 91
(c) 35 : 37 : 91 (d) 112 : 91 : 135

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (a) : Ratio = 7 : 8 : 9
 Increase = 30%, 40%, 50%
 Let the ratio \rightarrow 70 : 80 : 90
 According to the question,
 Number of seats in Mathematics = $\frac{70 \times 130}{100} = 91$
 Number of seats in Physics = $\frac{80 \times 140}{100} = 112$
 Number of seats in Chemistry = $90 \times \frac{150}{100} = 135$
 Ratio of increased seats = 91 : 112 : 135

8. If 15% of $x = 25\%$ of $y = 50\%$ of z Then find the value of $x : y : z$.

- (a) 3:5:10 (b) 10:6:3
 (c) 10:5:3 (d) 3:2:1

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

$$x \times \frac{15}{100} = y \times \frac{25}{100} = z \times \frac{50}{100}$$

$$3x = 5y = 10z = k \text{ (Let)}$$

$$3x = k$$

$$x = \frac{k}{3}$$

Same as,

$$y = \frac{k}{5}$$

$$z = \frac{k}{10}$$

$$x : y : z = \frac{k}{3} : \frac{k}{5} : \frac{k}{10}$$

$$x : y : z = \frac{10k : 6k : 3k}{30}$$

$$x : y : z = 10 : 6 : 3$$

9. An amount of 48,000 is divided between two brothers Anil and Aditya in the ratio 11 : 13. What is the share of Aditya?

- (a) ₹24,000 (b) ₹26,000
 (c) ₹2,000 (d) ₹22,000

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (b) : \therefore Share of Anil and Aditya = 11 : 13

$$\text{Share of Aditya} = \frac{13}{24} \times 48000 = ₹26000$$

10. A and B have together ₹2,300. If $\frac{2}{5}$ of A's

amount is equal to $\frac{8}{26}$ of B's amount, How much amount (in ₹) does B have?

- (a) 1,300 (b) 1,150
 (c) 1,200 (d) 1,000

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

$$\text{Ans. (a) : } \frac{2}{5} \text{ of A's Amount} = A \times \frac{2}{5}$$

$$\frac{8}{26} \text{ of B's Amount} = B \times \frac{8}{26}$$

\therefore According to the question,

$$\frac{2A}{5} = \frac{8B}{26}$$

$$\frac{A}{B} = \frac{10}{13} = \frac{10x}{13x}$$

$$\Rightarrow 23x \rightarrow ₹2300$$

$$x = ₹100$$

On putting the value of x .

$$\text{B's Amount is} = 13x = 13 \times 100 = ₹1300$$

11. A certain sum of money is divided among A, B and C. A gets one-third of the amount. B gets thrice as much as what C gets, and C gets ₹1200 less than what A gets find the share of A (in ₹)?

- (a) 1,200 (b) 3,600 (c) 4,800 (d) 2,400

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let total amount = ₹ x

$$\text{Amount received by A} = ₹ \frac{x}{3}$$

$$\text{Amount received by C} = ₹ \left(\frac{x}{3} - 1200 \right)$$

$$\text{Amount received by B} = 3 \left(\frac{x}{3} - 1200 \right) = ₹ (x - 3600)$$

$$\therefore \text{Total amount} = \frac{x}{3} + \frac{x}{3} - 1200 + x - 3600 = x$$

$$\frac{5x}{3} - 4800 = x$$

$$\frac{2x}{3} = 4800$$

$$x = 2400 \times 3$$

$$x = ₹ 7200$$

$$\Rightarrow \text{So, share of A} = \frac{x}{3}$$

On putting the value of x .

$$\therefore \text{Share of A} = 7200 \times \frac{1}{3} = ₹ 2400$$

12. ₹21,150 is distributed among A, B and C. The share of A is $\frac{4}{5}$ of the share of B, and the share

of B is $\frac{3}{4}$ of the share of C. After receiving their respective sums, C gives some money out of her share to A so that after the transfer, the ratio of the sums A and C have 7:9. What part of her initial share did C transfer to A?

- (a) $\frac{1}{5}$ (b) $\frac{1}{12}$ (c) $\frac{1}{8}$ (d) $\frac{1}{10}$

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question-

$$A = \frac{4}{5}B$$

$$\frac{A}{B} = \frac{4}{5} \dots\dots\dots(i)$$

$$\text{and } B = \frac{3}{4}C$$

$$\frac{B}{C} = \frac{3}{4} \dots\dots\dots(ii)$$

$$A : B : C = 12 : 15 : 20$$

$$\text{And } A + B + C = 12 + 15 + 20 = 47$$

$$\text{Now, share of A} = 21150 \times \frac{12}{47} = ₹5400$$

$$\text{and share of C} = 21150 \times \frac{20}{47} = 9000$$

If C gives x to A

Again according to question-

$$\frac{5400 + x}{9000 - x} = \frac{7}{9}$$

$$9(5400 + x) = 7(9000 - x)$$

$$48600 + 9x = 63000 - 7x$$

$$16x = 63000 - 48600$$

$$x = \frac{14400}{16} = 900$$

Hence, part of money given by C to A.

$$= \frac{900}{9000} = \frac{1}{10} \text{ part}$$

- 13. If 330 pencils were distributed among Rajesh, Suresh and Chandan in the ratio of $\frac{1}{4} : \frac{2}{3} : \frac{1}{3}$ respectively, then how many pencils did Chandan get?**

(a) 48 (b) 56 (c) 88 (d) 78

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) :

$$\text{Given ratio} = \frac{1}{4} : \frac{2}{3} : \frac{1}{3} = \frac{3}{12} : \frac{8}{12} : \frac{4}{12} = 3 : 8 : 4$$

Pencil received by Chandan,

$$= 330 \times \frac{4}{(3+8+4)} = 330 \times \frac{4}{15} = 88$$

- 14. A certain sum of money was divided among three friends : Rajeev, Kewal and Amit in the ratio of 2 : 3 : 7. If Amit's share is ₹ 15 more than that of Kewal, then what is the sum of money which was divided:?**

(a) ₹45 (b) ₹57 (c) ₹27 (d) ₹180

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let, Share of Rajeev, Kewal and Amit are 2x, 3x and 7x.

According to the question-

$$7x = 3x + 15$$

$$4x = 15$$

$$x = \frac{15}{4}$$

$$\begin{aligned} \text{Divided money} &= 2x + 3x + 7x \\ &= 12x \\ &= 12 \times \frac{15}{4} \\ &= ₹45 \end{aligned}$$

- 15. If $\frac{A}{4} = \frac{B}{5} = \frac{C}{6}$, then A : B : C is:**

(a) 4 : 5 : 6

(b) 5 : 6 : 4

(c) 4 : 6 : 5

(d) 4 : 8 : 9

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given, $\frac{A}{4} = \frac{B}{5} = \frac{C}{6}$

$$\text{Let, } \frac{A}{4} = \frac{B}{5} = \frac{C}{6} = k$$

$$\text{Then, } A = 4k, B = 5k \text{ and } C = 6k$$

$$\therefore A : B : C = 4k : 5k : 6k \\ = 4 : 5 : 6$$

- 16. If $\frac{1}{3}$ of A = $\frac{3}{4}$ of B = $\frac{1}{6}$ of C, then what is A : B : C ?**

(a) 9 : 18 : 4

(b) 4 : 9 : 18

(c) 9 : 4 : 18

(d) 18 : 9 : 4

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let,

$$\frac{1}{3} \text{ of A} = \frac{3}{4} \text{ of B} = \frac{1}{6} \text{ of C} = K$$

$$\frac{A}{3} = \frac{3B}{4} = \frac{C}{6} = K$$

$$\text{then, } A = 3K$$

$$B = \frac{4}{3}K$$

$$C = 6K$$

$$\text{Hence, } A : B : C = 3K : \frac{4}{3}K : 6K$$

$$= 9K : 4K : 18K$$

$$A : B : C = 9 : 4 : 18$$

- 17. Two numbers are in the ratio 3 : 2. If 8 and 6 are subtracted from the first and the second number respectively, the ratio becomes 8 : 5. The numbers are :**

(a) 32, 24

(b) 24, 16

(c) 40, 30

(d) 3, 2

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (b) : Let the numbers be 3x and 2x respectively.

According to the question-

$$\frac{3x-8}{2x-6} = \frac{8}{5}$$

$$15x-40=16x-48$$

$$x = 8$$

$$\text{Hence the first number} = 3 \times 8 = 24$$

$$\text{And second number} = 2 \times 8 = 16$$

18. An amount of money is to be divided between A, B and C in the ratio of 5 : 2 : 8. If the difference between the shares of A and C is Rs. 7,740. Then what will be the total amount?
 (a) ₹28,976 (b) ₹35,875
 (c) ₹38,700 (d) ₹30,983

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let A's share = $5x$
 B's Share = $2x$
 C's share = $8x$
 Given the difference of A's and C's shares = 7740
 $\Rightarrow 8x - 5x = 7740$
 $3x = 7740$
 $x = 2580$

On putting the value of x in A and B shares
 A's share = $5 \times 2580 = ₹ 12900$
 B's share = $2 \times 2580 = ₹ 5160$
 C's share = $8 \times 2580 = ₹ 20640$
 Total amount = ₹ 38700

19. An amount of money is to be divided between A, B and C in the ratio of 5 : 2 : 8. If the difference between the shares of A and C is Rs. 7,740. Then what will be the total amount?
 (a) ₹28,976 (b) ₹35,875
 (c) ₹38,700 (d) ₹30,983

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let A's share = $5x$
 B's Share = $2x$
 C's share = $8x$
 Given the difference of A's and C's shares = 7740
 $\Rightarrow 8x - 5x = 7740$
 $3x = 7740$
 $x = 2580$

On putting the value of x in A and B shares
 A's share = $5 \times 2580 = ₹ 12900$
 B's share = $2 \times 2580 = ₹ 5160$
 C's share = $8 \times 2580 = ₹ 20640$
 Total amount = ₹ 38700

20. In a college, if 15% of the boys are the same in number as one-third of the girls, then find the ratio of the number of boys to that of girls in the college.
 (a) 20 : 9 (b) 20 : 7
 (c) 9 : 20 (d) 7 : 20

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (a) : If the number of boys in a college = x
 No. of girls = y
 $\frac{x \times 15}{100} = \frac{1}{3}y$
 $\frac{x}{y} = \frac{20}{9}$
 \therefore Ratio of number of boys and girls = 20 : 9

21. Umesh and Kapil donated ₹750 and ₹975 respectively. The ratio of the amount of donation by Umesh to that by Kapil is:
 (a) 13 : 10 (b) 10 : 13
 (c) 3 : 1 (d) 1 : 3

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (b) : Given:

Amount donated by Umesh = ₹750

Amount donated by Kapil = ₹975

Ratio of the amount donated by Umesh and Kapil

$$= \frac{750}{975} = \frac{30}{39} = \frac{10}{13}$$

$$= 10 : 13$$

22. If three numbers are in the ratio of 4 : 3 : 8 and the smallest of these numbers is 42, find the largest of these numbers.

- (a) 96 (b) 104
 (c) 120 (d) 112

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : Ratio of number = 4 : 3 : 8
 Let, the numbers are = $4x, 3x, 8x$
 \therefore Smallest number = 42 (Given)
 $\therefore 3x = 42$
 $x = 14$
 Largest number = $8x$
 $= 8 \times 14$
 $= 112$

23. The product of three numbers is 10290. The numbers are in ratio 3 : 5 : 2. Find the largest number among the three numbers.

- (a) 60 (b) 35
 (c) 75 (d) 21

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (b) : Let the three numbers are $3x, 5x$ and $2x$
 According to the question,
 $3x \times 5x \times 2x = 10290$
 $30x^3 = 10290$
 $x^3 = \frac{10290}{30}$
 $x^3 = 343 \Rightarrow x = 7$
 Hence, the largest number = $5x = 5 \times 7 = 35$

24. The ratio of two numbers is 2 : 3. When 4 is added to the numbers, the ratio becomes 7:10. The difference between the numbers is:

- (a) 10 (b) 24
 (c) 12 (d) 08

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the numbers are $2x$ and $3x$
 According to the question, $\frac{2x+4}{3x+4} = \frac{7}{10}$
 $20x + 40 = 21x + 28$
 $x = 12$
 Difference = $3x - 2x$
 $\Rightarrow x = 12$

25. Dividing ₹742 into two parts in the ratio of 5 : 9 will give the two parts as :

- (a) ₹260, ₹482 (b) ₹265, ₹477
 (c) ₹275, ₹467 (d) ₹290, ₹452

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (b) : On dividing ₹742 in ratio 5 : 9

Let number $\Rightarrow 5x$ and $9x$.

$$5x + 9x = 742$$

$$14x = 742$$

$$x = 53$$

Then numbers

$$5x = 5 \times 53$$

$$= ₹265$$

$$9x = 9 \times 53 = ₹477$$

26. If $a : b = 3 : 2$, then $(7a + 9b) : (5a + 7b) = ?$

(a) $29 : 19$

(b) $29 : 39$

(c) $39 : 29$

(d) $19 : 39$

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let $a = 3x$ and $b = 2x$

then, $\frac{7a + 9b}{5a + 7b} = \frac{7 \times 3x + 9 \times 2x}{5 \times 3x + 7 \times 2x}$

$$= \frac{21x + 18x}{15x + 14x}$$

$$= \frac{39x}{29x} = \frac{39}{29} = 39 : 29$$

27. The ratio of five numbers are 1:2:3:4:5 and their sum is 30. Find the sum of second and fifth number?

(a) 15

(b) 14

(c) 13

(d) 12

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (b) : Let the number are $x, 2x, 3x, 4x, 5x$.

According to the question,

$$x + 2x + 3x + 4x + 5x = 30$$

$$15x = 30 \Rightarrow x = 2$$

Then the sum of (second+fifth) number $= 2x + 5x = 7x$
 $= 7 \times 2 = 14$

28. A is twice of B. B is half of D. D is three times of C. A is how many times of D?

(a) 0.5

(b) 4

(c) 3

(d) 1

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,

$$A : B = 2 : 1$$

$$B : D = 1 : 2$$

$$D : C = 3 : 1$$

By merging-

$$A : B : D : C = 6 : 3 : 6 : 2$$

$$A : D = 6 : 6$$

$$= 1 : 1$$

Therefore, A is equal to one time of D.

29. Two numbers are in the ratio 3 : 2. If 8 is subtracted from the first number and 6 is subtracted from the second number, the ratio becomes 5 : 4. The numbers are:

(a) 24, 16

(b) 3, 2

(c) 2, 3

(d) 16, 24

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let the first number and second number are $3x$ and $2x$ respectively.

According to the question,

$$\frac{3x - 8}{2x - 6} = \frac{5}{4}$$

$$12x - 32 = 10x - 30$$

$$12x - 10x = -30 + 32$$

$$2x = 2$$

$$x = 1$$

Hence the numbers $3x = 3 \times 1 = 3$

$$2x = 2 \times 1 = 2$$

30. The ratio of boys and girls in the class are 4:5. If 4 new boys are included in class then the number of boys increases by 20%. Find the number of girls in the class.

(a) 30

(b) 35

(c) 20

(d) 25

RRB NTPC 18.01.2017 Shift : 3

Ans : (d) Let the number of boys $= 4x$

and the number of girls $= 5x$

According to the question,

$$4x + 4 = 4x \times \frac{120}{100}$$

$$\Rightarrow 4x + 4 = \frac{24x}{5}$$

$$20x + 20 = 24x$$

$$20 = 4x \quad [x = 5]$$

Number of girls $= 5x = 5 \times 5 = 25$

31. In a mixture of 25 litre, the ratio of milk and water is 4:1. How much litre milk should be added more so that the ratio becomes 16:1?

(a) 21

(b) 25

(c) 60

(d) 36

RRB NTPC 19.04.2016 Shift : 2

Ans : (c) Amount of milk in mixture of 25 litre

$$= 25 \times \frac{4}{5} = 20 \text{ litres}$$

Amount of water $= 25 - 20 = 5l$

Let amount of milk added be xl ,

According to the question,

$$\frac{20 + x}{5} = \frac{16}{1}$$

$$\Rightarrow 20 + x = 16 \times 5$$

$$\Rightarrow x = 80 - 20 \quad \Rightarrow x = 60 \text{ liters}$$

32. Two numbers are in the ratio of 9 : 11. If 4 is subtracted from each of the numbers, then their ratio becomes 7 : 9. The sum of these two numbers is:

(a) 45

(b) 40

(c) 35

(d) 30

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let the first number = $9x$
 Second number = $11x$
 According to the question,

$$\frac{9x-4}{11x-4} = \frac{7}{9}$$

$$\Rightarrow 81x - 36 = 77x - 28$$

$$\Rightarrow 81x - 77x = -28 + 36$$

$$\Rightarrow 4x = 8$$

$$\Rightarrow x = 2$$

$$\therefore \text{First number} = 9 \times 2 = 18$$

$$\text{Second number} = 11 \times 2 = 22$$
 Hence the sum of both numbers = $18 + 22 = 40$

- 33. The ratio of the number of females to that of male employees in a small company is 2 : 3. If the number of male employees in the company is 90, then the total number of employees working in the company is:**
 (a) 120 (b) 90
 (c) 130 (d) 150

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the number of female and male employees in company = $2x$ and $3x$
 According to the question-
 $3x = 90 \Rightarrow x = 30$
 \therefore Total number of employees in company = $(3x + 2x)$
 $= 5 \times 30 = 150$

- 34. If $a : b = \sqrt{7} : \sqrt{3}$, then the value of $(3a + 2b) : (3a - 2b)$ is equal to:**

- (a) $\frac{2+\sqrt{21}}{(-2+\sqrt{21})}$ (b) $\frac{2+\sqrt{21}}{(2-\sqrt{21})}$
 (c) $\frac{2+\sqrt{21}}{(-2-\sqrt{21})}$ (d) $\frac{2-\sqrt{21}}{(2+\sqrt{21})}$

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (a) : Given,
 $a : b = \sqrt{7} : \sqrt{3} \Rightarrow \frac{a}{b} = \frac{\sqrt{7}}{\sqrt{3}}$
 Let $a = \sqrt{7}$, $b = \sqrt{3}$
 then, $(3a + 2b) : (3a - 2b)$
 $= (3 \times \sqrt{7} + 2 \times \sqrt{3}) : (3 \times \sqrt{7} - 2 \times \sqrt{3})$
 $= (3\sqrt{7} + 2\sqrt{3}) : (3\sqrt{7} - 2\sqrt{3})$
 $= \frac{3\sqrt{7} + 2\sqrt{3}}{3\sqrt{7} - 2\sqrt{3}}$
 On multiplying by $\sqrt{7}$ in numerator and denominator,
 $= \frac{21 + 2\sqrt{21}}{21 - 2\sqrt{21}} = \frac{\sqrt{21}(\sqrt{21} + 2)}{\sqrt{21}(\sqrt{21} - 2)}$
 $= \frac{2 + \sqrt{21}}{-2 + \sqrt{21}}$

- 35. If $x : y = 2 : 3$ then what is the value of $(5x + 3y) : (5x - 3y)$**

- (a) $19 : 3$ (b) $19 : 2$
 (c) $9 : 1$ (d) $19 : 1$

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (d) : $x : y = 2 : 3 \Rightarrow \frac{x}{y} = \frac{2}{3}$

Let- $x = 2$, $y = 3$
 then, $(5x + 3y) : (5x - 3y)$
 $= (5 \times 2 + 3 \times 3) : (5 \times 2 - 3 \times 3)$
 $= (10 + 9) : (10 - 9)$
 $= 19 : 1$

- 36. If $a : b = c : d = e : f = g : h = 1 : 3$ then find out the name of following**

$(pa + qc + re + sg) : (pb + qd + rf + sh)$

- (a) $1 : 3$ (b) $1 : 2$
 (c) $1 : 5$ (d) $1 : 4$

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (a) : $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{g}{h} = \frac{1}{3}$

$$\frac{pa}{pb} = \frac{qc}{qd} = \frac{re}{rf} = \frac{sg}{sh} = \frac{1}{3}$$

$$\frac{a}{b} = \frac{c}{d} = k \Rightarrow k = \frac{a+c}{b+d}$$

$$\therefore \frac{pa + qc + re + sg}{pb + qd + rf + sh} = \frac{1}{3}$$

$$(pa + qc + re + sg) : (pb + qd + rf + sh) = 1 : 3$$

- 37. If $\frac{a}{2} = \frac{b}{3} = \frac{c}{5}$ then find the value of $\frac{a+b+c}{c}$**

- (a) 2 (b) 10
 (c) 12 (d) 5

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (a) : $\frac{a}{2} = \frac{b}{3} = \frac{c}{5} = k$ (Let)

$$a = 2k$$

$$b = 3k$$

$$c = 5k$$

$$\therefore \frac{a+b+c}{c} = ?$$

$$\frac{2k + 3k + 5k}{5k} = ?$$

$$\boxed{2 = ?}$$

- 38. If $A : B = 2 : 3$, $B : C = 2 : 3$ and $C : D = 3 : 4$, then $A : D = ?$**

- (a) $2 : 4$ (b) $3 : 1$
 (c) $1 : 2$ (d) $1 : 3$

RRB NTPC 15.03.2021 (Shift-II) Stage I

Ans. (d)

$$A : B = 2 : 3 = \frac{A}{B} = \frac{2}{3}$$

$$B : C = 2 : 3 = \frac{B}{C} = \frac{2}{3}$$

$$C : D = 3 : 4 = \frac{C}{D} = \frac{3}{4}$$

and

$$\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D} = \frac{2}{3} \times \frac{2}{3} \times \frac{3}{4}$$

$$= \frac{A}{D} = \frac{1}{3}$$

or $A : D = 1 : 3$

39. If $X : Y = 4 : 5$, $Y : Z = 5 : 7$ and $Z : W = 7 : 9$, then $X : W$ is equal to:

- (a) 2 : 9 (b) 3 : 11
(c) 3 : 7 (d) 4 : 9

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (d) :

$$X : Y = 4 : 5$$

$$Y : Z = 5 : 7$$

$$Z : W = 7 : 9$$

$$X : W = 4 : 9$$

40. The difference of two numbers is equal to 30% of their sum find the ratio of the larger number to the smaller number.

- (a) 15 : 7 (b) 13 : 7
(c) 2 : 1 (d) 17 : 15

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (b) : Let the larger number and smaller number be x and y respectively.

According to the question,

$$(x - y) = (x + y) \times \frac{30}{100}$$

$$10(x - y) = 3(x + y)$$

$$10x - 10y = 3x + 3y$$

$$7x = 13y$$

$$x : y = 13 : 7$$

41. What should be added to each term of the ratio 7 : 11 to make it equal to 4 : 5 ?

- (a) 18 (b) 9
(c) 11 (d) 16

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let the required number = x

According to the question,

$$\frac{7+x}{11+x} = \frac{4}{5}$$

$$35 + 5x = 44 + 4x$$

$$x = 9$$

Hence the required number = 9

42. Two friend received a bonus of ₹2000 each in their bank accounts. They already have ₹47000 and ₹54000 in their respective bank account. Ratio of the amounts in their respective accounts will be:

- (a) 47 : 54 (b) 47 : 56
(c) 7 : 8 (d) 49 : 54

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$\text{Required ratio} = (47000+2000):(54000+2000)$$

$$= 49000 : 56000$$

$$= 7 : 8$$

43. The ratio of girls and boys in 504 students of a school are 11:13. If 12 more girls are admitted then find the new ratio.

- (a) 31:51 (b) 91:81
(c) 81:91 (d) 51:31

RRB NTPC 18.04.2016 Shift : 2

Ans : (c) Total students = 504

$$\text{girls : boys} = 11 : 13$$

$$\text{Total number of girls} = \frac{11}{24} \times 504 = 231$$

$$\text{Total number of boys} = 504 - 231 = 273$$

On adding 12 more girls

$$231 + 12 = 243$$

Hence, required ratio = 243 : 273 = 81 : 91

44. The ratio of two numbers are 3 : 4. When 3 is subtracted from both the numbers, the ratio becomes 2 : 3. Find the sum of the numbers.

- (a) 16 (b) 20
(c) 21 (d) 22

RRB NTPC 27.04.2016 Shift : 3

Ans : (c) Let the numbers are $3x$ and $4x$ respectively.

According to the question,

$$\frac{3x-3}{4x-3} = \frac{2}{3}$$

$$\Rightarrow 9x - 9 = 8x - 6$$

$$\Rightarrow 9x - 8x = 9 - 6$$

$$x = 3$$

$$\therefore \text{Sum of the numbers} = 3x + 4x = 7x = 7 \times 3 = 21$$

45. Some fruits were divided amongst A, B, C and D in the ratio 3 : 4 : 5 : 7. If A got 192 fruits, then how many fruits did B and C together get?

- (a) 576 (b) 756
(c) 567 (d) 675

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

$$A : B : C : D = 3 : 4 : 5 : 7$$

\therefore A got 192 fruits

$$\therefore 3 \text{ units} = 192$$

$$\therefore 1 \text{ unit} = \frac{192}{3} = 64$$

$$\text{Number of fruits of both B and C} = 4+5 = 9 \text{ unit} = 9 \times 64 = 576 \text{ fruits}$$

46. Are the numbers 30, 40, 45 and 60 in proportion?

- (a) Yes, they are in proportion
(b) Only 30 and 40 are in proportion
(c) Only 45 and 40 are not in proportion
(d) No, they are not in proportion

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (a) : Ratio of 30 and 40 = $\frac{30}{40} = 3:4$

Ratio of 45 and 60 = $\frac{45}{60} = 3:4$

$\therefore 30:40 = 45:60$

Hence, the numbers are in proportion.

47. What is the compound ratio of 45 : 75, 3 : 5, 51 : 68 and 256 : 81?

- (a) $\frac{64}{75}$ (b) $\frac{32}{45}$
(c) $\frac{128}{75}$ (d) $\frac{75}{32}$

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (a) : 45 : 75, 3 : 5, 51 : 68, 256 : 81

$$\begin{aligned}\text{Compound ratio} &= \frac{\text{Product of 1}^{\text{st}} \text{ term}}{\text{Product of 2}^{\text{nd}} \text{ term}} \\ &= \frac{45 \times 3 \times 51 \times 256}{75 \times 5 \times 68 \times 81} = \frac{3 \times 1 \times 51 \times 64}{5 \times 5 \times 17 \times 27} \\ &= \frac{3 \times 3 \times 64}{5 \times 5 \times 27} = \frac{64}{75}\end{aligned}$$

48. What will be the third proportional of 16 and 40?

- (a) 10 (b) 100
(c) 640 (d) 40

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let third proportional is x.

$$16 : 40 :: 40 : x$$

$$16 \times x = 40 \times 40$$

$$x = 10 \times 10$$

$$x = 100$$

49. The fourth proportional to 4, 9, 12 is: _____

- (a) 48 (b) 36
(c) 27 (d) 72

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the fourth proportional is x.

$$4 : 9 :: 12 : x$$

$$4x = 9 \times 12$$

$$x = 9 \times 3 = 27$$

Hence the fourth proportional = 27

50. Find the fourth proportional number of 2, 4 and 8.

- (a) 15 (b) 14
(c) 16 (d) 18

RRB NTPC 17.01.2017 Shift-3

Ans : (c) Let the fourth proportional number = x

$$\therefore 2 : 4 :: 8 : x$$

$2 \times x = 4 \times 8$ (by proportional law)

$$x = \frac{4 \times 8}{2} \Rightarrow x = 16$$

51. Find the value of k in $\frac{26}{21} : \frac{24}{9} :: k : \frac{14}{13}$.

- (a) $\frac{1}{3}$ (b) 2
(c) $\frac{1}{2}$ (d) 3

RRB NTPC 18.01.2017 Shift : 1

$$\begin{aligned}\text{Ans : (c)} \quad \frac{26}{21} : \frac{24}{9} :: k : \frac{14}{13} \\ \Rightarrow \frac{26}{21} \times \frac{14}{13} = \frac{24}{9} \times k \\ \Rightarrow k = \frac{26 \times 14 \times 9}{21 \times 13 \times 24} \Rightarrow k = \frac{1}{2}\end{aligned}$$

52. If 10% of x = 15% of y, then what will be the value of x : y ?

- (a) 2 : 3 (b) 2 : 1
(c) 3 : 2 (d) 1 : 2

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

$$\text{Ans. (c) : } x \times \frac{10}{100} = y \times \frac{15}{100}$$

$$10x = 15y$$

$$\frac{x}{y} = \frac{15}{10}$$

$$\frac{x}{y} = \frac{3}{2}$$

$$\text{or } x : y = 3 : 2$$

53. The sum of two numbers is 80 and their difference is 8. The ratio of the first number to the second number will be:

- (a) 13 : 9 (b) 12 : 11
(c) 13 : 11 (d) 11 : 9

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the numbers is a and b

According to the question,

$$a + b = 80 \quad \dots(i)$$

$$a - b = 8 \quad \dots(ii)$$

From equation (i) and (ii),

$$2a = 88$$

$$a = 44$$

and,

$$b = 36$$

$$\text{then, } a : b = 44 : 36 = 11 : 9$$

54. If $\frac{3}{5}$ of a bottle is filled, what is the ratio of the filled part to the empty part of the bottle?
 (a) 3:5 (b) 5:3 (c) 3:2 (d) 2:3

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (c) : Filled part of the bottle = $\frac{3}{5}$
 Empty part of the bottle = $1 - \frac{3}{5} = \frac{2}{5}$
 Ratio of the filled part to the empty part of the bottle.
 $\frac{\frac{3}{5}}{\frac{2}{5}} = \frac{3 \times 5}{2 \times 5} = \frac{3}{2} = 3 : 2$

55. John and Joseph have ₹19,000 and ₹ 26,000. If Joseph gives ₹ 1,000 to John. Then find the ratio of the amounts presents with John and Joseph respectively.
 (a) 2 : 3 (b) 20 : 27 (c) 4 : 5 (d) 19 : 26

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (c) : Given-
 John has = ₹ 19,000
 Joseph has = ₹ 26,000
 According to the question,
 Joseph gives ₹ 1000 to John.
 then John has = ₹ 20,000
 Joseph has = ₹ 25,000
 Hence, required ratio = $\frac{20,000}{25,000} = 4 : 5$

56. What is the sub-duplicate ratio of 225 : 144 ?

- (a) 12 : 5 (b) 5 : 12
 (c) 12 : 15 (d) 15 : 12

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (d) : The sub-duplicate ratio of 225 : 144
 $= \sqrt{\frac{225}{144}} = \frac{15}{12} = 15 : 12$

57. If $(m + n) : (m - n) = 7 : 3$, then $(m^3 + n^3) : (m^3 - n^3) = ?$

- (a) 133 : 117 (b) 117 : 13
 (c) 117 : 133 (d) 17 : 133

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (a) : Given,
 $\frac{m+n}{m-n} = \frac{7}{3}$
 On putting,
 $m+n=7$ and $m-n=3$
 $m=5$ and $n=2$
 then, $\frac{m^3+n^3}{m^3-n^3} = \frac{(5)^3+(2)^3}{(5)^3-(2)^3}$
 $= \frac{125+8}{125-8}$
 $\frac{m^3+n^3}{m^3-n^3} = \frac{133}{117}$
 Hence, $(m^3 + n^3) : (m^3 - n^3) = 133 : 117$

58. How much should we add to each of 7 and 9 so that the ratio of the two numbers thus formed is 13 : 14.

- (a) 19 (b) 17 (c) 18 (d) 16

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the required number is x
 According to the question,
 $\frac{7+x}{9+x} = \frac{13}{14}$
 $98+14x=117+13x$
 $x=117-98$
 $x=19$

59. What number has to be added to each term of 3 : 5 to make the ratio 5 : 6?

- (a) 7 (b) 6 (c) 11 (d) 5

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the number x be added.
 $\frac{3+x}{5+x} = \frac{5}{6}$
 $18+6x=25+5x$
 $x=25-18$
 $x=7$

60. In a firm the ratio of male and female members was 4 : 5. The firm decided to increase the number of males by 80% and the number of female by 60% then now in firm the new ratio of male and female members will be :

- (a) 8 : 10 (b) 18 : 15
 (c) 9 : 10 (d) 15 : 16

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (c) : Ratio of male and female in the firm = 4 : 5
 Ratio after increment = $4 \times \frac{180}{100} : 5 \times \frac{160}{100}$
 $= 9 : 10$

61. If 25% of the first number is three times of 50% of the second number then what will be the ratio of the first number and the second number?

- (a) 3 : 1 (b) 6 : 1
 (c) 2 : 3 (d) 1 : 6

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the first number A and the second number B -
 According to the question,
 $\frac{A \times 25}{100} = \frac{B \times 50}{100} \times 3$
 $\frac{A}{B} = \frac{6}{1}$
 $A : B = 6 : 1$

62. If $(3x+2y) : (3x-2y) = 5 : 3$ then find x : y.

- (a) $\frac{4}{3}$ (b) $\frac{32}{3}$
 (c) $\frac{16}{3}$ (d) $\frac{8}{3}$

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (d) : $\frac{3x+2y}{3x-2y} = \frac{5}{3}$
 $9x+6y=15x-10y$
 $16y=6x$
 $\frac{x}{y} = \frac{16}{6} \text{ or } \frac{x}{y} = \frac{8}{3}$

63. The ratio of two weights, 27kg and 108 g, is:

- (a) 250 : 1 (b) 300 : 1
 (c) 270 : 1 (d) 240 : 1

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (a) :

$$\text{Required ratio} = \frac{27 \times 1000 \text{ gm}}{108 \text{ gm}}$$

$$= \frac{1000}{4} = 250 : 1$$

64. If $a^3 + b^3 : a^3 - b^3 = 185 : 158$ then $a : b = ?$

- (a) 5 : 4 (b) 2 : 3
 (c) 10 : 2 (d) 7 : 3

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : From the question,

$$\frac{a^3 + b^3}{a^3 - b^3} = \frac{185}{158}$$

$$158 a^3 + 158 b^3 = 185 a^3 - 185 b^3$$

$$185 a^3 - 158 a^3 = 158 b^3 + 185 b^3$$

$$27 a^3 = 343 b^3$$

$$\frac{a^3}{b^3} = \frac{343}{27}$$

$$\frac{a}{b} = \sqrt[3]{\frac{343}{27}}$$

$$\frac{a}{b} = \frac{7}{3}$$

Hence, $a : b = 7 : 3$

65. If $A : B = 2 : 5$ and $B : C = 3 : 4$, then $A : C = ?$

- (a) 1:2 (b) 3:10
 (c) 2:3 (d) 5:4

RRB NTPC 28.03.2016 Shift : 2

Ans : (b) $A : B = 2:5$(i)

$B : C = 3:4$(ii)

Multiplying by 3 in equation (i) and by 5 in equation(ii)

$$A : B = 6:15$$

$$B : C = 15:20$$

Required ratio, $A : B : C = 6:15:20$

So $A : C = 6:20$

$$A : C = 3:10$$

66. Two numbers are 40% and 60% more than the third number respectively, what is the ratio of the first number to the second number?

- (a) 7 : 9 (b) 8 : 9
 (c) 8 : 7 (d) 7 : 8

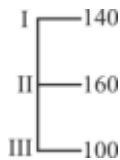
RRB NTPC 18.01.2017 Shift : 3

Ans : (d) Let the third number = 100

According to the question

I number = 140

II number = 160



Hence, required ratio

$$= \frac{I_{\text{num}}}{II_{\text{num}}} = \frac{140}{160} = \boxed{7:8}$$

67. If $A : B = 3 : 4$ and $B : C = 6 : 5$, then $A : (A + C) = ?$

- (a) 9:11 (b) 9:10
 (c) 9:19 (d) 6:7

RRB NTPC 16.04.2016 Shift : 3

Ans : (c)

$$\begin{array}{ccc} A & B & C \\ 3 & 4 & 6 \\ 4 & 6 & 5 \end{array}$$

$$18 : 24 : 20$$

$$9 : 12 : 10$$

$$\text{Hence, } \frac{A}{A+C} = \frac{9}{9+10} = \frac{9}{19}$$

68. If $a/b = 1/4$, $b/c = 1/8$ and $a = 2$ then the value of c is-

- (a) 8 (b) 16
 (c) 32 (d) 64

RRB NTPC 27.04.2016 Shift : 3

Ans : (d) $\frac{a}{b} = \frac{1}{4} \Rightarrow \frac{2}{b} = \frac{1}{4} \quad (\because a = 2)$

$$b = 2 \times 4$$

$$b = 8$$

and $\frac{b}{c} = \frac{1}{8} \Rightarrow \frac{8}{c} = \frac{1}{8}$

$$c = 8 \times 8 \Rightarrow c = 64$$

69. If $a : b = 3 : 5$, $c : b = 3 : 2$, $c : d = 5 : 6$ then find $a : d = ?$

- (a) 12 : 36 (b) 12 : 15
 (c) 1 : 3 (d) 11 : 36

RRB NTPC 18.04.2016 Shift : 3

Ans : (c) $a : b = 3 : 5$, $c : b = 3 : 2$, $c : d = 5 : 6$

$$b : c = 2 : 3$$

$$\therefore a : d = \frac{a}{b} \times \frac{b}{c} \times \frac{c}{d}$$

$$= \frac{3}{5} \times \frac{2}{3} \times \frac{5}{6} = \frac{1}{3}$$

70. If $a : b = 3 : 4$ and $b : c = 5 : 7$, then $a : c = ?$

- (a) 28 : 10 (b) 28 : 15
 (c) 15 : 28 (d) 10 : 28

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (c) $a : b = 3 : 4$
 $b : c = 5 : 7$
 $a : c = ?$

$$\begin{array}{l} a : b : c \\ 3 : 4 \\ 5 : 7 \\ \hline 15 : 20 : 28 \end{array}$$

Hence,
 $a : c = 15 : 28$

71. If $a : b = 3 : 4$ and $d : b = 4 : 3$, then find the ratio of a to d.

- (a) $9 : 16$ (b) $3 : 4$
 (c) $4 : 3$ (d) $16 : 9$

RRB NTPC 08.02.2021 (Shift-II) Stage I

Ans. (a) $a : b = (3 : 4) \times 3$
 $d : b = (4 : 3) \times 4$
 $a : b : d$
 $9 : 12 : 16$
 Hence, $a : d = 9 : 16$

72. Find the value of x if the three numbers 2.6, 1.3 and x are in certain ratio.

- (a) 1.95 (b) 1.83
 (c) 3.9 (d) 0.65

RRB NTPC 18.01.2017 Shift : 2

Ans : (d) $2.6 : 1.3 :: 1.3 : x$

$$\frac{2.6}{1.3} = \frac{1.3}{x}$$

$$x = \frac{1.3 \times 1.3}{2.6} \quad \boxed{x = 0.65}$$

73. Find the fourth proportional of 9, 17 and 27?

- (a) 57 (b) 48
 (c) 51 (d) 53

RRB NTPC 06.04.2016 Shift : 1

Ans : (c) Let the fourth proportional of 9, 17 and 27 is x.

$$\therefore 9 : 17 :: 27 : x$$

$$9 \times x = 17 \times 27 \Rightarrow x = \frac{17 \times 27}{9}$$

$$\Rightarrow x = 17 \times 3 = 51$$

74. If 14, x and 56 are in consecutive ratio, find the value of x.

- (a) 28 (b) 21
 (c) 8 (d) 42

RRB NTPC 30.04.2016 Shift : 1

Ans : (a) $\because 14, x$ and 56 are in consecutive ratio
 $\therefore 14 : x :: x : 56$

$$x^2 = \sqrt{14 \times 56}$$

$$x^2 = \sqrt{7 \times 2 \times 2 \times 2 \times 2 \times 7}$$

$$x = 7 \times 2 \times 2 = 28$$

75. Divide 1600 into three parts in such a way that the 7th part of 1st, 5th part of 2nd and 4th part of 3rd are equal.

- (a) 900, 500, 300 (b) 700, 500, 400
 (c) 700, 600, 300 (d) 800, 500, 400

RRB NTPC 03.04.2016 Shift : 3

Ans : (b) Suppose the first part, second part, and third part is x, y, and z respectively.

According to the question,

$$\frac{x}{7} = \frac{y}{5} = \frac{z}{4} = k \text{ (Suppose)}$$

$$x = 7k$$

$$y = 5k, \quad z = 4k$$

$$\text{Sum of } x + y + z = 7k + 5k + 4k = 16k$$

$$\text{First part } x = 1600 \times \frac{7k}{16k}$$

$$= 1600 \times \frac{7}{16} = 700$$

$$\text{Second part } y = 1600 \times \frac{5k}{16k}$$

$$= 1600 \times \frac{5}{16} = 500$$

$$\text{Third part } z = 1600 \times \frac{4k}{16k}$$

$$= 1600 \times \frac{4}{16} = 400$$

$$= 700, 500, 400$$

76. Divide 3740 into three parts in such a way that half of the first part one third of the second and one sixth part of the third part is equal.

- (a) 700, 1000, 2040 (b) 340, 1360, 2040
 (c) 680, 1020, 2040 (d) 500, 1200, 2040

RRB NTPC 02.04.2016 Shift : 2

Ans : (c) Let the parts are x, y and z.
 then,

$$\frac{x}{2} = \frac{y}{3} = \frac{z}{6} = a \text{ (suppose)}$$

$$x = 2a, \quad y = 3a \text{ and } z = 6a$$

According to the question,

$$\text{So, } 2a + 3a + 6a = 3740$$

$$11a = 3740$$

$$a = 340$$

$$\text{First part} = 2a = 2 \times 340 = 680$$

$$\text{Second part} = 3a = 3 \times 340 = 1020$$

$$\text{Third part} = 6a = 6 \times 340 = 2040$$

$$= 680, 1020, 2040$$

77. The salary of Q is 4/5 of salary of P which is Rs. 85,000 per month. Salary of R is 3/4 of Q. What is the per month salary of R.

- (a) Rs. 68,000 (b) Rs. 61,000
 (c) Rs. 51,000 (d) Rs. 45,000

RRB NTPC 05.04.2016 Shift : 2

Ans : (c) Salary of P = Rs. 85000

$$\text{Salary of Q} = 85000 \times \frac{4}{5} = \text{Rs. } 68000$$

$$\text{Salary of R} = \text{Salary of Q} \times \frac{3}{4} = 68000 \times \frac{3}{4}$$

$$= \text{Rs. } 51000 \text{ per month}$$

Type - 2

Problems Related to Income and Expenditure

78. Income and expenditure of a person are in the ratio of 9 : 5. If the income of the person is Rs. 27,000, then find his savings.

(a) Rs. 10,000 (b) Rs. 13,564
(c) Rs. 12,000 (d) Rs. 9,678

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the income of a person = $9x$
Expenditure of a person = $5x$

We know that :

Income = Expenditure + Savings

$9x = 5x + \text{Savings}$

Savings = $4x$

According to the question,

$9x = 27000$

$x = 3000$

Savings = $4x = 4 \times 3000 = ₹12000$

79. If the income of A is 15% more than of B and the income of B is 20% less than that of C, then the income of A, B and C respectively are in the ratio:

(a) 23 : 20 : 25 (b) 25 : 23 : 20
(c) 20 : 23 : 25 (d) 23 : 25 : 20

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$A = B \times \frac{115}{100}$$

$$\frac{A}{B} = \frac{23}{20}$$

$$B = C \times \frac{80}{100}$$

$$\frac{B}{C} = \frac{20}{25}$$

Hence, A : B : C = 23 : 20 : 25

80. The average of salaries of husband and wife is ₹65,000 and ratio of their salaries is 15:11 respectively. How much is the salary of the wife?

(a) ₹ 32,500 (b) ₹ 75,000
(c) ₹ 27,500 (d) ₹ 55,000

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (d) : Let the salary of husband = $15x$
and the salary of wife = $11x$

According to the question,

$$\frac{15x + 11x}{2} = 65,000$$

$$26x = 65000 \times 2$$

$$x = \frac{65000 \times 2}{26}$$

$$x = 5,000$$

Hence, the salary of wife = $11x = 11 \times 5000$
= ₹55,000

81. The ratio of the incomes of two persons is 7:5 and the ratio of their corresponding expenses is 9:7. If they save 1700 Rs. and 1100 Rs. consecutively then find the corresponding income of each person?

(a) ₹ 5,000, ₹ 5,000, (b) ₹ 4,500, ₹ 3,500,
(c) ₹ 5,500, ₹ 4,500, (d) ₹ 3,500, ₹ 2,500,

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (d) : Let,

Their income are $7x$ and $5x$

and expenditure = $9y$, $7y$

$\therefore \text{Income} = \text{Expenditure} + \text{Savings}$

\therefore According to the question,

$$7x - 9y = 1700 \dots\dots\dots(i)$$

$$5x - 7y = 1100 \dots\dots\dots(ii)$$

From equation (i) and (ii)-

$$49x - 63y = 11900$$

$$45x + 63y = 9900$$

$$4x = 2000$$

$$\Rightarrow x = 500$$

Then corresponding income of each person,

$$7x = 7 \times 500 = ₹3500$$

$$5x = 5 \times 500 = ₹2500$$

82. Divide ₹169 in the ratio 2 : 5 : 6 the rupees in the respective ratios are given by:

(a) 26, 66, 77 (b) 26, 65, 78
(c) 25, 67, 78 (d) 26, 70, 73

RRB NTPC 19.01.2017 Shift : 3

Ans : (b) First share = $\frac{169 \times 2}{13} = 26$

Second share = $\frac{169 \times 5}{13} = 65$

Third share = $\frac{169 \times 6}{13} = 78$

Divided amount = 26, 65, 78

83. If the ratio of three positive number is 3:7:8 and the sum of their squares is 7808, Then find the smallest number among them.

(a) 24 (b) 27
(c) 30 (d) 36

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the numbers are $3x$, $7x$ and $8x$.

According to the question,

$$(3x)^2 + (7x)^2 + (8x)^2 = 7808$$

$$9x^2 + 49x^2 + 64x^2 = 7808$$

$$122x^2 = 7808$$

$$x^2 = 64$$

$$x = 8$$

The smallest number = $3x = 3 \times 8 = 24$

84. The ratio of savings and expenditure of Kiran is 7:13 and his monthly income is 1,80,000. The savings are divided in the ratio of 4:3 between Mutual Funds and Equity. What is the amount of money saved in the form of Mutual Funds?

(a) ₹63,000 (b) ₹36,000
(c) ₹45,000 (d) ₹39,000

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (b) : Given,
Savings : Expenditure = 7:13
Income = Savings + Expenditure
= 7+13
=20

Mutual funds : Equity = 4:3

According to the question,

$$20 = 180000$$

$$1 = 9000$$

$$4 = 9000 \times 4$$

$$= 36000$$

Hence, savings money in mutual funds = ₹36000

85. The ratio of incomes of A and B is 5 : 7 and the ratio of their savings is 2 : 3. If A and B spend ₹35,400 and ₹48,600, respectively, then what is the difference (in ₹) between the incomes of B and A ?

- (a) ₹18000 (b) ₹17600
(c) ₹18600 (d) ₹20000

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (a) : Given,

Ratio of income of A and B = 5 : 7

Let the income of A and B are = 5x, 7x

Ratio of saving of A and B = 2 : 3

Let the saving of A and B are = 2y : 3y

According to the question,

$$5x - 2y = 35400 \text{ ——— (i)}$$

$$7x - 3y = 48600 \text{ ——— (ii)}$$

On multiplying equation (i) × 3 and equation (ii) × 2 and subtracting them

$$15x - 6y = 106200$$

$$14x - 6y = 97200$$

$$\begin{array}{r} - \quad + \quad - \\ \hline \end{array}$$

$$x = ₹9000$$

∴ Difference between the income of B and A = 7x - 5x
= 2x
= 2 × 9000
= ₹18000

86. The ratio of A's salary to that of B was 4 : 5. A's salary got increased by 10% and B's salary got increased by 20%. What is the ratio of A's salary to that of B now?

- (a) 15 : 14 (b) 14 : 11
(c) 11 : 14 (d) 11 : 15

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let, A's salary = 4x

And B's salary = 5x

According to the question-

When A's salary is increased by 10%,

$$= 4x + 4x \times \frac{10}{100}$$

$$= \frac{22}{5}x$$

When B's salary is increased by 20%,

$$= 5x + 5x \times \frac{20}{100}$$

$$= 6x$$

$$\text{Hence, required ratio} = \frac{\frac{22}{5}x}{6x} = 11/15$$

$$= 11 : 15$$

Type - 3

Problems Based on Coins/balls etc

87. In a box containing one rupee, 50 paise and 25 paise coins in the ratio 1 : 2 : 3. The number of 50 paise coins was eighty. How much money was there in the box.

- (a) 100 (b) 105
(c) 108 (d) 110

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (d) : Ratio of coins = x : 2x : 3x

According to the question,

$$2x = 80$$

$$x = 40$$

∴ Total number of coins 40, 80, 120

$$\text{Values (in Rs.)} = 40 \times 1 + \frac{40}{2} \times 2 + \frac{40 \times 3}{4}$$

$$40 + 40 + 30 = ₹110$$

88. ₹110 are contained in a box which consists of one rupee, 50 paise and 25 paise coins in the ratio 1:2:3. What is the number of 50 paise coins?

- (a) 80 (b) 77
(c) 78 (d) 79

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the ratio of 1 rupee, 50 paise and 25 paise coins is x, 2x and 3x respectively.

According to the question,

$$x + \frac{2x}{2} + \frac{3x}{4} = 110$$

$$4x + 4x + 3x = 110 \times 4$$

$$11x = 110 \times 4$$

$$x = 40$$

Hence, number of 50 paise coins = 2x = 2 × 40 = 80

89. In a bag of ₹ 10, ₹ 20 and ₹ 50 notes are kept in the ratio of 1:3:5 if the total value of money kept in the bag is ₹ 1920. What is the total number of ₹ 20 notes?

- (a) 6 (b) 30
(c) 18 (d) 12

RRB NTPC 18.01.2017 Shift : 2

Ans : (c)

Let number of notes of ₹ 10, Rs, 20, ₹ 50 = x, 3x, 5x

According to the question,

$$\text{Total cost} = 10 \times x + 20 \times 3x + 50 \times 5x = 1920$$

$$\Rightarrow 320x = 1920$$

$$\Rightarrow x = 6$$

Total number of notes of ₹20 = 3x

$$= 3 \times 6 = 18$$

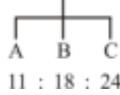
Type - 4 Miscellaneous

90. Three friends A, B and C divide ₹ 5,525 amongst them in such a way that if ₹ 50, ₹ 100 and ₹ 75 are removed from the sums that A, B and C received respectively, then the share of the sums that they get would have been in the ratio of 11 : 18 : 24. How much did C initially receive?

- (a) ₹ 1,900 (b) ₹ 1,150
(c) ₹ 2,325 (d) ₹ 2,475

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (d) : According to the question,
 $= ₹ 5,525 - (50 + 100 + 75)$
 Remaining amount = 5300



$$\text{Share of C} = \frac{24}{53} \times 5300 = ₹ 2400$$

Hence, share of C initially = 2400 + 75
 $= ₹ 2,475$

91. In a school, the number of boys and girls were in the ratio 5 : 7. Eight more boys were admitted during the session. The new ratio of girls and boys is 1:1. In the beginning the difference between the number of boys and that of girls was :

- (a) 12 (b) 08
(c) 02 (d) 10

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : Suppose no. of boys in school = 5x
 and number of girls in school = 7x
 According to the question eight more boys were admitted,

$$\therefore \frac{5x+8}{7x} = \frac{1}{1}$$

$$5x+8 = 7x$$

$$2x = 8$$

$$x = 4$$

Required difference = 7x - 5x
 $= 2x$
 $= 2 \times 4$
 $= 8$

92. If $(a+b) : (b+c) : (c+a)$ is 6 : 7 : 8 and also $a+b+c = 14$, then what is the value of c?

- (a) 8 (b) 10
(c) 6 (d) 12

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (c) : $(a+b) : (b+c) : (c+a) = 6 : 7 : 8$

$$a+b+c = 14$$

Let $(a+b) = 6x$... (1)

$(b+c) = 7x$... (2)

$(c+a) = 8x$... (3)

On adding equation (1), (2) and (3) -

$$(a+b) + (b+c) + (c+a) = 6x + 7x + 8x$$

$$2(a+b+c) = 21x$$

$$a+b+c = \frac{21}{2}x$$

$$6x + c = \frac{21}{2}x \quad (\text{from equation (1) ... (4)})$$

$$a+b+c = 14 \quad (\text{Given})$$

$$\frac{21}{2}x = 14$$

$$x = \frac{28}{21}$$

On putting the value of x in equation (4)

$$6 \times \frac{28}{21} + c = \frac{21}{2} \times \frac{28}{21}$$

$$c = \frac{21}{2} \times \frac{28}{21} - 6 \times \frac{28}{21}$$

$$c = \frac{28}{21} \left[\frac{21}{2} - 6 \right]$$

$$c = \frac{28}{21} \times \frac{9}{2}$$

$$c = 6$$

93. If a, b, c and d are in continued proportion, then $(ma^3 + nb^3 - rc^3) : (mb^3 + nc^3 - rd^3) = ?$

- (a) d : a (b) b : c
(c) a : d (d) c : b

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (c) : a, b, c and d are in continued proportion.

Let-

$$\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = k$$

then $c = dk$, $b = ck$, $a = bk$

$$b = (dk)k$$

$$b = dk^2$$

$$\therefore a = bk$$

$$\Rightarrow a = (dk^2)k$$

$$\frac{a}{d} = k^3 \dots \dots \dots (i)$$

Now,

$$\frac{ma^3 + nb^3 - rc^3}{mb^3 + nc^3 - rd^3} = \frac{m(dk^3)^3 + n(dk^2)^3 - r(dk)^3}{m(dk^2)^3 + n(dk)^3 - rd^3}$$

$$= \frac{d^3 k^3 (mk^6 + nk^3 - r)}{d^3 (mk^6 + nk^3 - r)}$$

$$\frac{ma^3 + nb^3 - rc^3}{mb^3 + nc^3 - rd^3} = k^3$$

\therefore From equation (i)-

Hence $\frac{ma^3 + nb^3 - rc^3}{mb^3 + nc^3 - rd^3} = \frac{a}{d} = a : d$

10.

Partnership

1. A, B and C are partners in a business with a total capital of ₹33,000. The profit at the end of the year is ₹15,000 that is to be divided in proportion to their capitals. A receives ₹4,500 and B receives ₹5,500 as their shares in profit. Find C's capital (in ₹)?

- (a) ₹ 11,000 (b) ₹ 13,000
(c) ₹ 12,000 (d) ₹ 14,000

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,
Profit of C = Total profit – Profit of (A + B)
 $= 15000 - (4500 + 5500)$
 $= 15000 - 10000$
 $= ₹5000$
Ratio of profit (A : B : C) = 4500 : 5500 : 5000
A : B : C = 9 : 11 : 10
and A + B + C = 9 + 11 + 10 = 30
Capital of C = Total Capital $\times \frac{\text{Share of C}}{\text{Share of (A + B + C)}}$
 $= 33000 \times \frac{10}{(9+11+10)}$
 $= 33000 \times \frac{10}{30}$
 $= 11000$
Hence, C's capital = ₹11000.

2. Grandfather of Sukhdev and Baldev divided an amount of ₹ 2150 between them in the ratio 20 : 23. They both donated ₹ 100 each for charity out of their Shares. What will be the new ratio of their respective amounts?

- (a) 80:77 (b) 6:7
(c) 19:22 (d) 120:123

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to question –
Share of Sukhdev = $\frac{2150 \times 20}{43} = ₹ 1000$
Share of Baldev = $\frac{2150 \times 23}{43} = ₹ 1150$

Ratio after donating ₹ 100

$$= (1000 - 100) : (1150 - 100)$$

\Rightarrow So, the new ratio is

$$= 900 : 1050 = 6 : 7$$

3. XYZ company distributes its profit or loss to ratio of its partners X, Y and Z in the ratio of $\frac{1}{3}$, $\frac{1}{2}$, $\frac{1}{6}$ respectively. If Z gets ₹1,76,802 in his share, then find the amount received by Y.

- (a) Rs.5,30,406 (b) Rs.88,401
(c) Rs.3,53,604 (d) Rs.2,65,203

RRB NTPC 28.04.2016 Shift : 1

Ans : (a) Ratio of share of X, Y and Z = $\frac{1}{3} : \frac{1}{2} : \frac{1}{6}$
 $= 2 : 3 : 1$

\therefore Z's share = ₹1,76,802

\therefore Received amount by Y = $\frac{3}{1} \times 176802$
 $= ₹5,30,406$

4. A, B and C entered into partnership. A invested 3 times as much as B and B invested $\frac{2}{3}$ times of what C invested. At the end of the year the total profit was ₹6,600. B's share in the profit is?

- (a) ₹1,600 (b) ₹1,200
(c) ₹1,800 (d) ₹2,400

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) : A's investment = 3 times of B's investment

$$A = B \times 3$$

$$\frac{A}{B} = \frac{3}{1} \quad \dots(i)$$

B's investment = $\frac{2}{3}$ times of C's investment

$$B = C \times \frac{2}{3}$$

$$\frac{B}{C} = \frac{2}{3} \quad \dots(ii)$$

From, equation (i) and (ii),

$$A : B : C = 6 : 2 : 3$$

Let, investment money by A, B and C are $6x$, $2x$ and $3x$.

According to the question-

$$\begin{aligned} \text{B's share} &= \frac{2x}{(6x + 2x + 3x)} \times 6600 \\ &= \frac{2x}{11x} \times 6600 \\ &= ₹1200 \end{aligned}$$

5. Three persons invested an amount of money in a business in the ratio $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$. At the end of a year, the total profit was ₹15600. The largest share received in profit will be:

- (a) ₹7200 (b) ₹7000
(c) ₹7500 (d) ₹8000

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (a) : Given that,

$$\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$$

On multiplying by 12-

$$6 : 4 : 3$$

According to the question-

$$13 \text{ unit} = ₹15600$$

$$1 \text{ unit} = ₹1200$$

The largest share of profit = 6 unit

$$1 \text{ unit} = ₹1200$$

The largest share received in profit is

$$6 \text{ unit} = ₹7200$$

6. Mahesh and Hareesh have invested ₹ 20,000 and ₹ 30,000 respectively, in a business. If after 3 months, Hareesh withdrew ₹ 5,000 from his investment, then the ratio in which they divide the profits will be?

- (a) 16 : 21 (b) 16 : 22
(c) 16 : 20 (d) 16 : 23

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to question

Profit ratio of Mahesh and Hareesh

$$= (20000 \times 12) : (30000 \times 3 + 25000 \times 9)$$

$$= 240 : (90 + 225)$$

$$= 240 : 315$$

$$= 16 : 21$$

7. A and B entered into a partnership investing ₹20000/- and ₹16000/-, respectively. After 3 months, C joined them with an investment of ₹15000/-. What is B's share (in ₹) if the half yearly profit is ₹4350/-

- (a) ₹1,760 (b) ₹20,00
(c) ₹1,600 (d) ₹1,850

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (c) : A : B : C

A and B invest for six month while C invests after three months.

∴ Capital × Time = Dividend

Hence,

$$\begin{array}{ccc} \text{A} & \text{B} & \text{C} \\ ₹20000 \times 6 \text{ month} & : ₹16000 \times 6 \text{ month} & : ₹15000 \times 3 \text{ month} \end{array}$$

$$20 \times 6 : 16 \times 6 : 15 \times 3$$

$$120 : 96 : 45$$

$$40 : 32 : 15$$

$$\text{Total unit} = 40 + 32 + 15 = 87 \text{ unit Dividend}$$

$$87 \text{ unit} = 4350$$

$$1 \text{ unit} = \frac{4350}{87}$$

$$\text{So, B'S share, 32 unit} = \frac{4350}{87} \times 32$$

$$= 50 \times 32 = ₹1600$$

8. Two partners A and B have started business with the capitals of ₹6,000 and ₹8,000 respectively. If they made profit of ₹5,600 then the share (in ₹) of A is:

- (a) ₹2,800 (b) ₹2,100
(c) ₹3,200 (d) ₹2,400

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,

$$\text{Ratio of capital A and B} = 6000 : 8000$$

$$A : B = 6 : 8$$

$$A : B = 3 : 4$$

$$\text{Share of A} = \text{Total profit} \times \frac{\text{Share of A}}{\text{Share of (A + B)}}$$

$$= 5600 \times \frac{3}{(3+4)}$$

$$= 5600 \times \frac{3}{7}$$

$$= 2400$$

Hence, share of A = ₹2400.

9. Sita, Gita and Rita invested ₹20,000, ₹50,000 and ₹40,000 respectively, in a business. The net profit for the year was ₹12,100, which was divided in proportion to their investments. Find the share of profit earned by Rita?

- (a) ₹4,300 (b) ₹4,100
(c) ₹4,400 (d) ₹4,200

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (c) : Ratio of profit of Sita, Gita and Rita = Ratio of capital invested for the given time.

$$= 20,000 : 50,000 : 40,000$$

$$= 2 : 5 : 4$$

Hence share of Rita in earned profit

$$= 12,100 \times \frac{4}{11} = ₹4,400$$

10. Suman, Sakshi and Mayank form a partnership. Suman invests 5 times of Sakshi and Sakshi invests $\frac{3}{5}$ of mayank's investment.

The total profit at the end of the year was ₹23000. Find the share of Sakshi

- (a) Rs.5000 (b) Rs.3000
(c) Rs.4000 (d) Rs.4500

RRB NTPC 18.04.2016 Shift : 2

Ans : (b) Let the investment by Sakshi = ₹x

$$\text{Then Suman's investment} = ₹5x$$

$$\text{Mayank} \times \frac{3}{5} = x \Rightarrow \text{Mayank} = \frac{5x}{3}$$

Profit ratio of Sakshi, Suman and Mayank

$$= x : 5x : \frac{5x}{3}$$

$$= 3 : 15 : 5$$

$$\therefore \text{Share of profit of Sakshi} = \frac{3}{23} \times 23000 = ₹3000$$

11. Raja started a vegetable business with a capital of ₹4400. After a few months Ranga joined this business with a capital of ₹2400. Out of the total annual profit of ₹1200. Raja's share is ₹800. When did Ranga join this business as a partner?

- (a) 2 Months before the end of the year
(b) 2 Months after Raja started the business
(c) 1 Month after Raja started the business
(d) 1 Month after the year ended

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (c) : Let Ranga join the business after x months.

$$\text{Ratio of profit of both in business} = 4400 \times 12 : 2400 \times (12 - x)$$

$$= 22 : (12 - x)$$

According to the question,

$$\text{Raja's share} = 800 = 1200 \times \frac{22}{22 + 12 - x}$$

$$22 + 12 - x = 33$$

$$34 - x = 33$$

$$x = 1 \text{ month}$$

So, Ranga joined the business 1 month after Raja started the business.

12. Suraj and Vimal started a business. They earned ₹ 8,400 as profit. At the end of the year, Suraj got ₹4,500 as his share of profit. What is the ratio of the amounts invested by Suraj and Vimal for the business :

- (a) 13 : 15 (b) 28 : 13
(c) 15 : 13 (d) 15 : 28

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) : Total profit in 1 year = ₹8400

$$\text{Share of the profit of Suraj} = ₹4500$$

$$\therefore \text{Share of the profit of Vimal} = 8400 - 4500 = ₹3900$$

$$\text{Hence Required ratio} = 4500 : 3900 = 15 : 13$$

13. Mohan invested ₹10,00,00 in the textile business. After a few month, Sohan invest ₹40000 to become his partner. At the end of the year, the total profit was divided between them in ratio 3:1. After how many month did Sohan join the business.

- (a) 3 (b) 2
(c) 4 (d) 5

RRB NTPC 16.04.2016 Shift : 1

Ans : (b) : Let Sohan join in the business is after x months

According to the question,

$$\frac{100000 \times 12}{40000 \times (12 - x)} = \frac{3}{1}$$

$$\Rightarrow 1200000 = 120000 \times (12 - x)$$

$$\Rightarrow 10 = 12 - x$$

$$\Rightarrow x = 12 - 10 = 2 \text{ months.}$$

Hence after 2 month Sohan was joined the business.

Work & Time

Type - 1 Simple Problems Related to Work and Time

1. Paras can complete 40% of the work in 8 days while Deepti & Paras together can complete 10% of the work in a day. Find the time taken by Deepti alone to complete the work.

(a) 23 days (b) 21 days
(c) 22 days (d) 20 days

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (d) : Paras can complete 40% of work in 8 day then,

Time taken by Paras to complete whole work

$$= 8 \times \frac{100}{40}$$

$$= \frac{5}{2} \times 8$$

$$= 20 \text{ days}$$

(Deepti + Paras) can do 10% of work in 1 day.

$$\therefore \text{Then, they can complete whole work} = 1 \times \frac{100}{10}$$

$$= 10 \text{ days}$$

According to the question,

$$\text{Then, } \frac{1}{10} = \frac{1}{20} + \frac{1}{\text{Deepti}}$$

$$\frac{1}{\text{Deepti}} = \frac{1}{10} - \frac{1}{20} = \frac{2-1}{20} = \frac{1}{20}$$

Hence Time taken by Deepti to complete the whole work = 20 days

2. Rama packs 36 boxes in 1 h. Her sister needs 3 h to pack the same number. How much time will they together take to pack these 36 boxes ?

(a) 40 min (b) 38 min (c) 45 min (d) 42 min

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (c) : \because Rama packs 36 boxes in 60 minutes.

$$\therefore 1 \text{ minute} = \frac{36}{60} = \frac{3}{5}$$

And his sister packs 36 boxes in 180 minutes

$$\therefore 1 \text{ minute} = \frac{36}{180} = \frac{1}{5}$$

$$\therefore \text{Boxes packed by both in 1 minute} = \frac{3}{5} + \frac{1}{5}$$

$$= \frac{4}{5}$$

$$\therefore \text{Time taken by both to pack 36 boxes} = \frac{36}{\frac{4}{5}}$$

$$= \frac{36 \times 5}{4} = 45 \text{ minutes}$$

3. Ranga and Raju together can complete a task in 6 days. If Ranga alone can complete the same task in 18 days, then how many days will Raju take to complete the task?

(a) 9 days (b) 7 days
(c) 8 days (d) 6 days

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (a) : Let Raju complete that work in x days.

One day work of Ranga and Raju = $\frac{1}{6}$ part

One day work of Ranga = $\frac{1}{18}$ part

According to the question—

$$\frac{1}{x} + \frac{1}{18} = \frac{1}{6} \Rightarrow \frac{1}{x} = \frac{1}{6} - \frac{1}{18}$$

$$\frac{1}{x} = \frac{3-1}{18}$$

$$\frac{1}{x} = \frac{1}{9}$$

Hence, Raju will complete this work in 9 days.

4. A and B together can do a piece of work in 6 days and A alone can do the same work in 9 days. In how many days will B alone complete the same work?

(a) 16 days (b) 20 days
(c) 12 days (d) 18 days

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (d) : Work done by A in one day = $\frac{1}{9}$ part

Work done by (A+B) in one day = $\frac{1}{6}$ part

$$\text{Work done by B in one day} = \frac{1}{6} - \frac{1}{9}$$

$$= \frac{3-2}{18}$$

$$= \frac{1}{18} \text{ part}$$

Hence, B alone can complete the same work in 18 days.

5. A can complete a task in 40 days. If A and B can complete it together in 30 days, then in how many days can B alone complete the task?

(a) 150 days (b) 100 days
(c) 125 days (d) 120 days

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

$$\text{Ans. (d) : B's one day work} = \frac{1}{A+B} - \frac{1}{A} = \frac{1}{30} - \frac{1}{40}$$

$$= \frac{4-3}{120} = \frac{1}{120}$$

Hence, B alone can complete the task in 120 days.

6. A man and a boy, working together, can finish a task in 24 days. If, for the last 6 days, the man works alone, then the task can be finished in 26 days. In how many days can the boy alone finish the task?

(a) 72 days (b) 54 days
(c) 48 days (d) 36 days

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let, boy completed work in x days and man completed in y days.

According to the question,

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{24} \text{ ----- (1)}$$

$$\frac{20}{x} + \frac{26}{y} = 1 \text{ ----- (2)}$$

On subtracting equation, from equation (1) $\times 26$

$$\frac{26}{x} + \frac{26}{y} = \frac{26}{24}$$

$$\frac{20}{x} + \frac{26}{y} = 1$$

$$\frac{6}{x} = \frac{2}{24}$$

$$\frac{6}{x} = \frac{2}{24}$$

$$x = 72$$

Hence, the boy alone can finish the task in 72 days.

7. X can copy 60 pages in 4 minutes, X and Y together can copy 750 pages in 30 minutes. In how many minutes can 'Y' copy 100 pages?

(a) 8 mins (b) 16 mins
(c) 10 mins (d) 5 mins

RRB NTPC 19.04.2016 Shift : 3

Ans : (c) 1 minute work of X = $\frac{60}{4} = 15$ pages

1 minute work of X and Y = $\frac{750}{30} = 25$ pages

\therefore One minute work of Y = $25 - 15 = 10$ pages

\therefore Time taken by Y to copy 100 pages

$$= \frac{100}{10} = 10 \text{ minutes}$$

8. X does 25% of a work in 20 days. Y joins up with X and they together do the remaining work in 15 days. So in how many days can Y alone do the same work?

(a) 30 days (b) $25\frac{1}{2}$ days

(c) $26\frac{2}{3}$ days (d) $26\frac{1}{3}$ days

RRB NTPC 27.04.2016 Shift : 2

Ans : (c) X can complete 25% of a work = $\frac{1}{4}$ part in 20 days

\therefore X will complete whole work = 80 days

Remaining work = $1 - \frac{1}{4} = \frac{3}{4}$ part

Both complete $\frac{3}{4}$ part of work together in 15 days

\therefore Both will complete whole work together
 $= 15 \times \frac{4}{3} = 20$ days

\therefore One day work of Y = $\frac{1}{20} - \frac{1}{80} = \frac{4-1}{80} = \frac{3}{80}$ part

Y will complete the work = $\frac{80}{3} = 26\frac{2}{3}$ days

9. If Ram can do a task in 20 days and Krishna can do it in 30 days, then the time taken by both to complete the task working together is:

(a) 10 days (b) 8 days
(c) 15 days (d) 12 days

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (d) : Ram can do the work in 20 days.

Work done by Ram in one day = $\frac{1}{20}$

Work done by Krishna in one day = $\frac{1}{30}$

According to the question,

Work done by both Ram and Krishna in one day

$$= \frac{1}{20} + \frac{1}{30} = \frac{5}{60} = \frac{1}{12}$$

Therefore, total work done by Ram and Krishna in 12 days.

10. A and B together can complete a piece of work in 35 days. A alone can complete the same work in 60 days. B alone will be able to complete same work in:

(a) 96 days (b) 72 days
(c) 42 days (d) 84 days

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,

Work done by A and B in one day = $\frac{1}{35}$

\therefore Work done by B in one day = Work done by A and B in one day – Work done by A in one day

$$= \frac{1}{35} - \frac{1}{60} = \frac{12-7}{420} = \frac{5}{420} = \frac{1}{84}$$

\therefore Time taken by B alone to do the total work = 84 days

11. Anmol can complete a piece of work in 25 days. Together with Garima he can complete the same work in 15 days. While Anmol and Aseema working together can complete the same work in 20 days. In how many days can Garima and Aseema working together complete the same work?

(a) 30 days (b) 29 days
(c) $\frac{300}{11}$ days (d) $\frac{250}{9}$ days

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (c) : From the question,
 $\text{Anmol} \rightarrow 25 \text{ days}$
 $\text{Anmol} + \text{Garima} \rightarrow 15 \text{ days}$
 $\text{Anmol} + \text{Aseema} \rightarrow 20 \text{ days}$

Efficiency of Garima = $20 - 12 = 8$
 Efficiency of Aseema = $15 - 12 = 3$
 According to the question,
 Required Time = $\frac{300}{8+3} = \frac{300}{11}$ Days.

12. If A can do a piece of work in 8 days, B can do it in 10 days and C can do it in 20 days, then in how many days can A, B and C together do the same work?

- (a) $3\frac{7}{11}$ days (b) 3 days
 (c) 4 (d) $2\frac{7}{11}$ days

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (a) : According to the question,
 One day's work of A, B and C

$$\begin{aligned} &= \frac{1}{8} + \frac{1}{10} + \frac{1}{20} \\ &= \frac{5+4+2}{40} \\ &= \frac{11}{40} \text{ part} \end{aligned}$$

(A + B + C) can finish the work = $\frac{40}{11}$ days = $3\frac{7}{11}$ Days

13. A and B together can do a piece of work in 30 days. Together with C they can complete the same work in 24 days. In how many days can C alone complete the same work?

- (a) 96 days (b) 150 days
 (c) 90 days (d) 120 days

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (d) :

One day's work of (A + B) = $\frac{1}{30}$ days

(A + B + C)'s 1 day work = $\frac{1}{24}$ days

According to the question,

$$\frac{1}{24} = \frac{1}{30} + \frac{1}{C}$$

1 day's work of C = $\frac{1}{24} - \frac{1}{30}$

$$= \frac{5-4}{120}$$

$$= \frac{1}{120} \text{ part}$$

Hence, C alone can complete the work in 120 days.

14. A and B together can do piece of work in 10 days. If A alone can do the same work in 15 days and C alone can do the same work in 20 days, then in how many days can B and C together do the same work?

- (a) 12 days (b) 11 days
 (c) $12\frac{1}{5}$ days (d) $11\frac{3}{4}$ days

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : (A + B) together do the work = 10 days

Time taken by A alone = 15 days

According to the question,

$$\frac{1}{(A+B)} = \frac{1}{A} + \frac{1}{B}$$

$$\frac{1}{10} = \frac{1}{15} + \frac{1}{B}$$

$$\frac{1}{B} = \frac{1}{10} - \frac{1}{15}$$

$$= \frac{3-2}{30}$$

$$B = 30 \text{ days}$$

Time taken by C to do the same work = 20 days

$$\text{Then time taken by (B + C)} = \frac{30 \times 20}{50}$$

$$= \frac{60}{5}$$

$$= 12 \text{ days}$$

15. A and B together can finish a piece of work in 10 days. B and C together can finish it in 15 days. A and C together can finish it in 18 days. In how many days will A, B and C finish it together?

- (a) 7 days (b) 8 days
 (c) 9 days (d) 10 days

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$A + B = \frac{1}{10} \quad \dots\dots\dots (i)$$

$$B + C = \frac{1}{15} \quad \dots\dots\dots (ii)$$

$$C + A = \frac{1}{18} \quad \dots\dots\dots (iii)$$

Adding equation (i), (ii) and (iii) ,

$$2[A + B + C] = \frac{1}{10} + \frac{1}{15} + \frac{1}{18} = \frac{9+6+5}{90} = \frac{20}{90}$$

Hence work done by A, B, and C in a day

$$= \frac{20}{90 \times 2}$$

Hence, total time taken by A, B and C to complete the work

$$= \frac{90 \times 2}{20} = 9 \text{ days}$$

16. A alone can finish a task in 30 days. He works for 6 days on the same task and then B finishes it in 24 days. In how many days can A and B together finish the task?

- (a) 25 days (b) 10 days
 (c) 20 days (d) 15 days

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,

$$A's\ 1\ day\ work = \frac{1}{30}\ part$$

$$A's\ 6\ days\ work = \frac{6}{30} = \frac{1}{5}\ part$$

$$\therefore\ Remaining\ work = 1 - \frac{1}{5} = \frac{4}{5}\ part$$

$$\therefore\ \frac{4}{5}\ part\ of\ work\ done\ by\ B = 24\ days$$

Time taken by B to complete the work = 30 days

\therefore Time taken by both (A + B) to complete the work

$$= \frac{1}{\left(\frac{1}{30} + \frac{1}{30}\right)} = \frac{1}{\frac{1+1}{30}} = 15\ days$$

17. If A, B and C can complete a task alone in 15 days, 20 days and 25 days respectively, then in how many days can they complete the same task if they work together?

- (a) $\frac{150}{47}$ days (b) $\frac{225}{47}$ days
(c) $\frac{300}{47}$ days (d) $\frac{75}{47}$ days

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$Work\ done\ by\ A\ in\ 1\ day = \frac{1}{15}\ part$$

$$Work\ done\ by\ B\ in\ 1\ day = \frac{1}{20}\ part$$

$$Work\ done\ by\ C\ in\ 1\ day = \frac{1}{25}\ part$$

$$\begin{aligned} Work\ done\ by\ (A+B+C)\ in\ 1\ day &= \left(\frac{1}{15} + \frac{1}{20} + \frac{1}{25}\right) part \\ &= \left(\frac{20+15+12}{300}\right) part \\ &= \frac{47}{300}\ part \end{aligned}$$

Hence, they can complete the work in $\frac{300}{47}$ days.

18. A can do a piece of work alone in 32 days, while together with B she can do the work in 24 days. If C alone can do the work in 64 days, in how many days can B and C together do the work.

- (a) $38\frac{4}{5}$ days (b) $38\frac{3}{5}$ days
(c) $38\frac{4}{5}$ days (d) $38\frac{2}{5}$ days

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (d) : Work done by A in one day = $\frac{1}{32}$ part

Work done by A and B in one day = $\frac{1}{24}$ part

$$\begin{aligned} Work\ done\ by\ B\ in\ one\ day &= \frac{1}{24} - \frac{1}{32} \\ &= \frac{4-3}{96} = \frac{1}{96} \end{aligned}$$

$$Work\ done\ by\ C\ in\ one\ day = \frac{1}{64}\ part$$

Work done by B and C in 1 day

$$\begin{aligned} &= \frac{1}{96} + \frac{1}{64} \\ &= \frac{2+3}{192} = \frac{5}{192}\ part \end{aligned}$$

$$Time\ taken\ by\ B\ and\ C\ to\ complete\ the\ total\ work = \frac{192}{5} = 38\frac{2}{5}\ days$$

19. A and B can finish a project in 10 days, B and C can finish it in 20 days, and C and A can finish it in 30 days. If A, B and C work together, then they will finish the project in:

- (a) $\frac{120}{11}$ days (b) $\frac{110}{7}$ days
(c) $\frac{120}{7}$ days (d) $\frac{130}{11}$ days

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (a) : Total work = LCM of 10, 20 and 30 = 60

Time	Total work	Efficiency
A+B \rightarrow 10	60	6
B+C \rightarrow 20		3
C+A \rightarrow 30		2

$$\begin{aligned} Efficiency\ of\ (A+B+C) &= 2\ (A+B+C) = 11 \\ A+B+C &= \frac{11}{2} \end{aligned}$$

$$A+B+C = \frac{11}{2}$$

Hence, time taken by A, B and C to complete the work

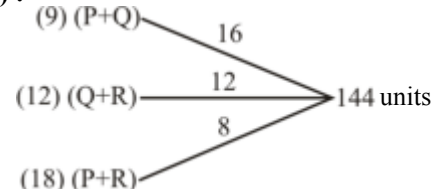
$$= \frac{60}{11/2} = \frac{120}{11}\ days$$

20. P and Q can reap a field in 9 days, Q and R can reap it in 12 days and P and R in 18 days. Find how many days will they take to reap the field if all three work together?

- (a) 39 days (b) 4 days
(c) 8 days (d) 19.5 days

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (c) :



$$Work\ done\ by\ 2\ (P+Q+R)\ in\ one\ day = (16+12+8) = 36\ units$$

$$Work\ done\ by\ (P+Q+R)\ in\ one\ day = \frac{36}{2} = 18\ units$$

$$\begin{aligned} Time\ taken\ by\ (P+Q+R)\ to\ complete\ the\ work &= \frac{144}{18} = 8\ days \end{aligned}$$

21. A, B and C can complete a piece of work in 10 days, 15 days and 20 days respectively. If they work together, then the work will be completed in:

- (a) $4\frac{7}{13}$ days (b) $4\frac{6}{13}$ days
(c) $4\frac{9}{13}$ days (d) $4\frac{8}{13}$ days

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question-

$$\therefore \text{A's 1 day work} = \frac{1}{10} \text{ part}$$

$$\text{B's 1 day work} = \frac{1}{15} \text{ part}$$

$$\text{C's 1 day work} = \frac{1}{20} \text{ part}$$

$$\therefore (\text{A, B and C's 1 day work}) = \frac{1}{10} + \frac{1}{15} + \frac{1}{20}$$

$$= \frac{6+4+3}{60} = \frac{13}{60}$$

$$\therefore \text{Time taken by A, B and C to complete the whole work} = \frac{60}{13} = 4\frac{8}{13} \text{ days}$$

22. Ramu and Somu together can complete a task in 10 days. Somu and Dhamu together can complete it in 12 days. Dhamu and Ramu together can complete it in 15 days. If Ramu, Somu and Dhamu work together, in how many days will they complete the task?

- (a) 8 days (b) 6 days
(c) 9 days (d) 7 days

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (a) : One day work of (Ramu+Somu) = $\frac{1}{10}$

One day work of (Somu+Dhamu) = $\frac{1}{12}$

One day work of (Dhamu+Ramu) = $\frac{1}{15}$

One day work of 2 (Ramu+Somu+Dhamu)

$$= \left(\frac{1}{10} + \frac{1}{12} + \frac{1}{15} \right)$$

$$= \frac{6+5+4}{60}$$

$$= \frac{15}{60} = \frac{1}{4}$$

One day work of (Ramu+Somu+Dhamu)

$$= \frac{1}{4 \times 2} = \frac{1}{8}$$

$\therefore \frac{1}{8}$ of the work done by (Ramu+Somu+Dhamu) in one day.

Hence, total time taken by (Ramu+Somu+Dhamu) to complete the work in 8 days.

23. A and B working together can complete a piece of work in 24 days. They did this work for 18 days and then C completed the remaining work in 10 days. In how many days can A, B and C together complete the work?

- (a) 34 days (b) 24 days
(c) 32 days (d) 15 days

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) (A+B)'s one day work = $\frac{1}{24}$ part

$$(A+B)'s 18 \text{ days work} = \frac{18}{24} = \frac{3}{4} \text{ part}$$

$$\text{Remaining work} = 1 - \frac{3}{4} \text{ part} = \frac{1}{4} \text{ part}$$

\therefore Time taken by C to complete the work = 40 days

$$\text{C's one day work} = \frac{1}{40} \text{ part}$$

$$(A+B+C)'s \text{ one day work} = \frac{1}{24} + \frac{1}{40}$$

$$= \frac{5+3}{120}$$

$$= \frac{8}{120} \text{ part} = \frac{1}{15} \text{ part}$$

\therefore Time taken by (A+B+C) to complete the work = $1 \times 15 = 15$ days

24. A and B can finish a work in 9 days, B and C can finish it in 12 days and A and C can finish it in 18 days. In how many days can A, B and C finish the work together?

- (a) 9 days (b) 8 days
(c) 7 days (d) 6 days

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : The work done by (A+B) in one day = $\frac{1}{9}$ part

The work done by (B + C) in one day = $\frac{1}{12}$ part

The work done by (A + C) in one day = $\frac{1}{18}$ part

The work done by 2(A+B+C) in one day = $\frac{1}{9} + \frac{1}{12} + \frac{1}{18}$

$$2(A+B+C) = \frac{4+3+2}{36}$$

$$2(A+B+C) = \frac{9}{36}$$

$$(A+B+C) = \frac{9}{72} = \frac{1}{8} \text{ part}$$

Therefore, (A + B + C) can complete the work in 8 days.

25. Ali can complete a piece of work in 8 days. Balvinder can complete the same work in 10 days. In order to complete the work in 4 days, they asked Chander to join them and were able to finish the work in time. In how many days can Chander alone finish the work?

- (a) 20 days (b) 40 days
(c) 14 days (d) 12 days

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let Chander's one day work = $\frac{1}{x}$ unit

Ali's one day work = $\frac{1}{8}$ unit

Balvinder's one day work = $\frac{1}{10}$ unit

According to the question-

$$\frac{1}{8} + \frac{1}{10} + \frac{1}{x} = \frac{1}{4}$$

$$\frac{1}{x} = \frac{1}{4} - \frac{1}{8} - \frac{1}{10}$$

$$\frac{1}{x} = \frac{10 - 5 - 4}{40}$$

$$\frac{1}{x} = \frac{1}{40}$$

\therefore Chander alone can complete the work in 40 days.

- 26. A and B together can do a piece of work in 21 days. With the help of C, they can finish it in 14 days. In how many days will C alone be able to finish the work?**

- (a) 7 days (b) 42 days
(c) 35 days (d) $\frac{35}{2}$ days

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (b) : One day work of (A + B) = $\frac{1}{21}$

One day work of (A + B + C) = $\frac{1}{14}$

$$\therefore \text{One day work of C} = \frac{1}{14} - \frac{1}{21}$$

$$= \frac{3 - 2}{42}$$

$$= \frac{1}{42}$$

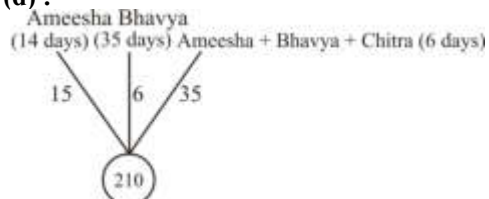
Hence C will complete the work alone in 42 days.

- 27. Ameesha can complete a task by herself in 14 days, while it takes Bhavya 35 days to complete it alone. Together with Chitra, they can complete the task in 6 days. How many days will Chitra need to complete the task alone?**

- (a) 43 days (b) 14 days
(c) 28 days (d) 15 days

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (d) :



\therefore One day work capacity of Ameesha, Bhavya and Chitra = 35

One day work capacity of Chitra = $35 - (15 + 6) = 14$

Total time taken by Chitra to complete the work = $\frac{210}{14} = 15$ days

- 28. A and B can finish a work in 10 days, B and C can finish the same work in 15 days and A and C can finish the same work in 20 days. In how many days can B finish this work alone?**

- (a) $\frac{20}{7}$ days (b) $\frac{24}{7}$ days
(c) $\frac{120}{7}$ days (d) $\frac{60}{7}$ days

RRB NTPC 12.04.2016 Shift : 1

Ans : (c) One day work done of (A+B+C)

$$= \frac{1}{2} \left(\frac{1}{10} + \frac{1}{15} + \frac{1}{20} \right) = \frac{1}{2} \times \left(\frac{6+4+3}{60} \right) = \frac{13}{120} \text{ part}$$

\therefore One day work of B

= One day work of (A+B+C) - One day work of (A+C)

$$= \frac{13}{120} - \frac{1}{20}$$

$$= \frac{13-6}{120}$$

$$= \frac{7}{120} \text{ part}$$

Hence B alone will finish the work in $\frac{120}{7}$ days.

Type-2 Problems Based on Joining a Group of People

- 29. 12 men can build a wall in 24.5 days. How many men would be able to build five such walls in 49 days?**

- (a) 40 men (b) 30 men
(c) 50 men (d) 28 men

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (b) : Given,

$$M_1 = 12, \quad M_2 = ?$$

$$D_1 = 24.5, \quad D_2 = 49$$

$$W_1 = 1 \text{ wall}, \quad W_2 = 5 \text{ wall}$$

Then,

$$\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$$

$$\frac{12 \times 24.5}{1} = \frac{M_2 \times 49}{5}$$

$$M_2 = 30 \text{ Men}$$

- 30. Twelve men can complete a task in 16 days. Thirty-two women can complete the same task in 12 days. Eight men and eight women together worked for 12 days, after which the women dropped and 8 men joined. In how many days the men will be able to complete the remaining task?**

- (a) 9 days (b) 2 days (c) 3 days (d) 10 days

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$MD = WD \quad [M - \text{Man}, W - \text{Woman}]$$

$$12M \times 16 = 32W \times 12$$

$$1M = 2W$$

$$\therefore 32W \times 12 = 12(8M + 8W) + (8M + 8W) \times \text{day}$$

$$32W \times 12 = 12(16W + 8W) + 32W \times \text{day}$$

$$32 \times 12 = 12 \times 24 + 32 \times \text{day}$$

$$48 = 36 + 4 \times \text{day}$$

$$\text{day} = \frac{12}{4} = 3$$

So, remaining work will be completed in 3 days.

31. A group of men decided to complete a work in 10 days, but five of them remained absent. If the rest of the group completed the work in 12 days, find the original number of men.
- (a) 30 men (b) 25 men
(c) 24 men (d) 40 men

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the no. of men = x

Formula- $M_1d_1 = M_2d_2$

$$x \times 10 = (x - 5) \times 12$$

$$5x = 6x - 30$$

$$x = 30$$

Hence the no. of men will be 30.

32. 10 men can complete a task in 18 days. After 6 days, 5 more men join. In how many days the remaining work will be completed?
- (a) 8 days (b) 10 days
(c) 12 days (d) 6 days

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (a) : As per the question,

From $M_1D_1 = M_2D_2$ (Where M → man, D → day)

$$10 \times 18 = 10 \times 6 + (10 + 5) \times D_2$$

$$180 = 60 + 15D_2$$

$$15D_2 = 180 - 60 = 120$$

$$D_2 = 8 \text{ days}$$

33. 15 men or 25 women can reap a field in 22 days. How many days will 9 men and 18 women take to reap it?

- (a) $16\frac{2}{3}$ days (b) $17\frac{2}{3}$ days
(c) $15\frac{2}{3}$ days (d) $18\frac{2}{3}$ days

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (a) :

$$15M = 25F$$

$$\frac{M}{F} = \frac{5}{3}$$

$$3M = 5F \Rightarrow 9M = 15F$$

$$15M \times 22 = (9M + 18F) \times d_2$$

$$25F \times 22 = 33F \times d_2$$

$$\frac{50}{3} = d_2$$

$$d_2 = 16\frac{2}{3}$$

34. Sixteen men can complete a work in 24 days. Twenty four women can complete the same work in 32 days. Sixteen men and sixteen women together worked for twelve days, after which women dropped. How many more men are to be taken to complete the remaining work in 2 days?

- (a) 32 days (b) 24 days
(c) 64 days (d) 48 days

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$\begin{array}{l} M \rightarrow 16 \times 24 \\ W \rightarrow 24 \times 32 \end{array} \quad \begin{array}{l} \nearrow \\ \searrow \end{array} \quad 24 \times 32 = 768$$

$$16M \times 24 = 24W \times 32$$

$$\frac{M}{W} = \frac{2}{1}$$

$$(16M + 16W) \times 12 + (16M + XM) \times 2 = 768$$

$$48 \times 12 + (32 + 2X) \times 2 = 768$$

$$576 + (64 + 4X) = 768$$

$$4X = 768 - 640$$

$$4X = 128$$

$$X = 32$$

35. A certain number of men can complete a task in 50 days. If there are 5 men more, then it can be finished in 10 days less. How many men are there?

- (a) 30 men (b) 10 men
(c) 40 men (d) 20 men

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,

Men Time (days)

x 50

x+5 40

$$\frac{x}{x+5} = \frac{40}{50}$$

$$\frac{x}{x+5} = \frac{4}{5}$$

$$5x = 4(x+5)$$

$$5x = 4x + 20$$

$$x = 20 \text{ men}$$

36. 2 men and 3 boys can complete a piece of work in 18 days while 3 men and 2 boys can complete the same work in 15 days. In how many days will 4 men and 2 boys complete the work?

- (a) $11\frac{16}{19}$ days (b) $1\frac{1}{19}$ days
(c) $11\frac{6}{19}$ days (d) $1\frac{16}{19}$ days

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$(2M + 3B) \times 18 = (3M + 2B) \times 15$$

{Where M = Man, B = Boy}

$$36M + 54B = 45M + 30B$$

$$24B = 9M$$

$$B = \frac{3}{8}M$$

Let 4 men and 2 boys can complete the work in x days

$$\text{Now, } (4M + 2B)x = (3M + 2B) \times 15$$

$$(4M + \frac{6}{8}M)x = (3M + \frac{6}{8}M) \times 15$$

$$38x = 30 \times 15$$

$$x = \frac{225}{19}$$

$$x = 11\frac{16}{19} \text{ days}$$

37. 8 boys and 12 girls together can finish a project work in 5 days. If it takes 50 days for one boy alone to finish the same project, how many days are required for one girl to complete the same project work?

- (a) 300 days (b) 150 days
(c) 200 days (d) 275 days

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (a) : By formula, $M_1 \times D_1 = M_2 \times D_2$

[D = day, M = Man]

According to the question,

$$(8B + 12G) \times 5 = 50B$$

$$8B + 12G = 10B$$

$$12G = 2B$$

$$1B = 6G$$

Let 1 girl complete the work in x days.

According to the question,

$$1B \times 50 = 1G \times x$$

$$6G \times 50 = x \times G \quad (\because 1B = 6G)$$

$$x = 50 \times 6$$

$$x = 300 \text{ days}$$

- 38. 15 men can complete a task in 30 days. In how many days can 20 men complete that task?**

(a) 26 (b) 22.5 (c) 24 (d) 28.5

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$M_1 = 15 \quad M_2 = 20$$

$$D_1 = 30 \quad D_2 = ?$$

From, $M_1 \times D_1 = M_2 \times D_2$

$$15 \times 30 = 20 \times D_2$$

$$D_2 = 22.5$$

20 men will take 22.5 days to complete the work.

- 39. 15 male employees or 20 female employees of a company can complete a project in 26 days. How many days will 30 male employees and 12 female employees together take to complete the project?**

(a) 8 days (b) 10 days (c) 12 days (d) 14 days

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (b) : As per the question-

$$15 M = 20 W$$

$$M : W = 4 : 3$$

Let 30 male and 12 female complete the total work in x days.

According to the question-

$$(30 M + 12 W) \times x = 15 M \times 26$$

$$(30 \times 4 + 12 \times 3) \times x = 15 \times 4 \times 26$$

$$(120 + 36) \times x = 60 \times 26$$

$$x = \frac{60 \times 26}{156} = 10$$

- 40. A man and a woman can complete a work in 8 and 12 days respectively. How many women must assist 2 men to complete the work in 2 days?**

(a) 3 women (b) 2 women
(c) 4 women (d) 5 women

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (a) : $\because M \rightarrow \text{Man}$

$W \rightarrow \text{Women}$

\because One day work of one man = $1/8$

One day work of one woman = $1/12$

$$\Rightarrow M : W = 3 : 2 \Rightarrow 2 M = 3 W \quad \dots(i)$$

Let x woman need with two males

According to the question,

$$1W \times 12 = (3W + xW) \times 2 \quad \{\because 2M = 3W\}$$

$$\Rightarrow 12W = 6W + 2xW$$

$$\Rightarrow 6 + 2x = 12$$

$$\Rightarrow 2x = 6$$

$$\Rightarrow x = 3$$

- 41. 8 men working 9 hours a day can complete a task in 20 days. How long will 7 men working 10 hours a day take to complete the same task.**

(a) $\frac{103}{55}$ days

(b) $\frac{21}{2}$ days

(c) 21 days

(d) $\frac{144}{7}$ days

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : Formula,

$$M_1 D_1 H_1 = M_2 D_2 H_2$$

$$8 \times 9 \times 20 = 7 \times 10 \times x$$

$$x = \frac{144}{7} \text{ days}$$

- 42. 25 women can complete a task in 60 days. After how many days from the start of the task should 5 more women join them so that the task is complete in 55 days?**

(a) 20 days

(b) 30 days

(c) 25 days

(d) 27 days

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let after x days from the start of the task 5 more women should join-

$$M_1 D_1 = M_1 D_1 + M_2 D_2$$

$$25 \times 60 = 25 \times x + (25 + 5) \times (55 - x)$$

$$1500 = 25x + 1650 - 30x$$

$$5x = 1650 - 1500$$

$$5x = 150$$

$$x = 30$$

- 43. 3 boys and 5 girls can finish a project in 6 days, while 2 boys and 7 girls can finish it in 8 days. In how many days will 8 girls complete it?**

(a) 33 days

(b) 30 days

(c) 36 days

(d) 35 days

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (a) Let a boy do that work in x days and a girl can do that work in y days.

According to the question,

$$\frac{3}{x} + \frac{5}{y} = \frac{1}{6} \dots\dots(i) \quad , \quad \frac{2}{x} + \frac{7}{y} = \frac{1}{8} \dots\dots(ii)$$

By subtracting eq (i) $\times 2$ and eq (ii) $\times 3$,

$$\frac{6}{x} + \frac{10}{y} = \frac{1}{3}$$

$$\frac{6}{x} + \frac{21}{y} = \frac{3}{8}$$

$$\frac{10}{y} - \frac{21}{y} = \frac{1}{3} - \frac{3}{8}$$

$$-\frac{11}{y} = \frac{8-9}{24}$$

$$-\frac{11}{y} = -\frac{1}{24}$$

$$y = 264$$

\because Time taken by 8 girl to complete the work

$$= \frac{264}{8} = 33 \text{ days}$$

44. When 5 men can build a wall in 12 days, to build a wall 50% more than the original wall in 10 days, the number of men required is:
 (a) 8 men (b) 9 men
 (c) 7 men (d) 4 men

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\text{From, } \frac{M_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times D_2 \times H_2}{W_2}$$

According to the question,

$$\frac{5 \times 12}{1} = \frac{M_2 \times 10}{2}$$

$$\frac{5 \times 12 \times 2}{2 \times 10} = M_2$$

$$M_2 = 9 \text{ Men}$$

45. 10 men and 5 women complete a work in 60 days. If a man can do the work of two women, then how much time will 5 men and 20 women take to complete half of that work?
 (a) 25 days (b) 36 days
 (c) 27 days (d) 50 days

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) $\therefore \frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$

According to the question,

$$\frac{(10M + 5W)60}{1} = \frac{(5M + 20W) \times D_2}{\frac{1}{2}} \dots\dots\dots(i)$$

$\therefore 1M = 2W$ (Given)

On putting, $1M = 2W$ in equation (i),

$$\frac{(10 \times 2W + 5W) \times 60}{1} = \frac{(5 \times 2W + 20W) \times D_2}{1}$$

$$25W \times 60 = 30W \times 2 \times D_2$$

$$D_2 = 25 \text{ days}$$

46. 12 people can complete a work in X days, now 8 more people are employed. The entire work was completed in 60 days. Find the value of X.
 (a) 80 days (b) 100 days
 (c) 55 days (d) 45 days

RRB NTPC 18.04.2016 Shift : 3

Ans : (b) Given-

$M_1 = 12 \text{ Men, } D_1 = X \text{ days}$

$M_2 = 12 + 8 = 20 \text{ Men, } D_2 = 60 \text{ days}$

From $M_1 D_1 = M_2 D_2$

$$12 \times X = 20 \times 60$$

$$X = \frac{20 \times 60}{12}$$

$$X = 100 \text{ days}$$

47. In a project a team of 54 members can do a work in 35 hours. In how many hours can 18 members do the same work?
 (a) 90 hours (b) 120 hours
 (c) 105 hours (d) 110 hours

RRB NTPC 12.04.2016 Shift : 2

Ans : (c) $M_1 = 54 \text{ members}$

$H_1 = 35 \text{ hours}$

$M_2 = 18 \text{ members}$

$H_2 = ?$

We know that;

$$H_2 = \frac{M_1 \times H_1}{M_2}$$

$$= \frac{54 \times 35}{18}$$

$$= 105 \text{ hours}$$

48. A cleaning company employs 42 sweepers to clean a building in 25 days. 10 days later, 12 sweepers left the job. If the cleaning work is finished in 10 days then how many more sweepers need to be hired?
 (a) 30 (b) 32 (c) 33 (d) 21

RRB NTPC 28.04.2016 Shift : 1

Ans : (c) Suppose the number of extra employees = x

According to the question,

$$\text{From, } M_1 \times D_1 = M_2 \times D_2$$

$$(25 - 10) \times 42 = (30 + x) \times 10$$

$$15 \times 42 = 10 \times (30 + x)$$

$$30 + x = \frac{630}{10} \Rightarrow 63$$

$$x = 63 - 30$$

$$x = 33$$

Type - 3

Problems Based on Leaving and Joining in The Middle of The Work/Remaining Work

49. A can complete 12% of the work in 15%, of the allotted time. A and B worked for the entire period of the allotted time and the work got completed on time. What portion of the work was done by B?
 (a) 25% (b) 20%
 (c) 10% (d) 15%

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : A will work to complete in allotted time

$$= \frac{12}{15} = \frac{4}{5} \text{ part, remaining } \frac{1}{5} \text{ part done by B}$$

$$= \frac{1}{5} \times 100 = 20\% \text{ part will be completed by B}$$

50. A can do 75% of the work in 30 days while B can do 50% of the same work in 18 days. If they work together. What fraction of the work will be done in 1 day?

$$(a) \frac{7}{120} \quad (b) \frac{1}{19}$$

$$(c) \frac{19}{360} \quad (d) \frac{1}{20}$$

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (c) : A can do 75% of the work = 30 days
 A can do 100% of the work = 40 days
 B can do 50% of the work = 18 days
 B can do 100 % of work = 36 days

$$\begin{aligned}\text{One day's work of (A + B)} &= \frac{1}{40} + \frac{1}{36} \\ &= \frac{9+10}{360} \\ &= \frac{19}{360} \text{ unit}\end{aligned}$$

51. A can do a piece of work in 24 days and B can do $\frac{2}{5}$ of the same work in 12 days. Both work together for 6 days. How much work is still left?

- (a) $\frac{17}{20}$ (b) $\frac{13}{20}$ (c) $\frac{11}{20}$ (d) $\frac{9}{20}$

RRB NTPC (Stage-II) -14/06/2022 (Shift-II)

Ans. (c) :

Time taken to complete the work by A = 24 days

$$\begin{aligned}\text{Time taken to complete the work by B} &= \frac{5}{2} \times 12 \\ &= 30 \text{ days}\end{aligned}$$

According to the question,

Work done by A and B in six days

$$\begin{aligned}&\frac{6}{24} + \frac{6}{30} \\ &= \frac{1}{4} + \frac{1}{5} \\ &= \frac{5+4}{20} \\ &= \frac{9}{20} \text{ part}\end{aligned}$$

$$\begin{aligned}\text{So, remaining work} &= 1 - \frac{9}{20} \\ &= \frac{11}{20}\end{aligned}$$

52. P can do a work in 10 days. Q can do the same work in 15 days. If they work together for 5 days, how much of the work will they complete?

- (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{5}{6}$

RRB NTPC 30.03.2016 Shift : 1

Ans : (d) Work done by both P and Q in one day

$$= \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6} \text{ part}$$

$$\text{So work done by both in 5 days} = \frac{5}{6}$$

53. A can do $\frac{1}{3}$ th part of work in 5 days and B can do $\frac{2}{5}$ th of that work in 10 days. In how many days the work will be completed if they work together?

- (a) $9\frac{3}{8}$ days (b) $8\frac{31}{8}$ days
 (c) $7\frac{1}{8}$ days (d) $4\frac{1}{4}$ days

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (a) : A completes $\frac{1}{3}$ of work in 5 days.

A completes full work = $3 \times 5 = 15$ days

B completes $\frac{2}{5}$ of work in 10 days.

B completes full work = $\frac{5}{2} \times 10 = 25$ days

$$\begin{aligned}\text{Work done by A and B in one day} &= \frac{1}{15} + \frac{1}{25} \\ &= \frac{5+3}{75} \\ &= \frac{8}{75} \text{ part}\end{aligned}$$

So, the time taken by A and B to complete the work

$$\begin{aligned}&= \frac{75}{8} \text{ days} \\ &= 9\frac{3}{8} \text{ days}\end{aligned}$$

54. A alone can complete $\frac{2}{5}$ of a task in 12 days, while B alone can complete $\frac{3}{4}$ of the same task in 25 days. In how many days can they complete the task if they work together?

- (a) $\frac{150}{19}$ days (b) $\frac{300}{19}$ days
 (c) $\frac{75}{19}$ days (d) $\frac{1}{19}$ days

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) : Time taken by A to complete the whole work

$$= 12 \times \frac{5}{2} = 30 \text{ days}$$

Time taken by B to complete the whole work =

$$25 \times \frac{4}{3} = \frac{100}{3} \text{ days}$$

$$\begin{aligned}\text{One day work of A and B} &= \left(\frac{1}{30} + \frac{3}{100} \right) \text{ part} \\ &= \frac{10+9}{300} = \frac{19}{300} \text{ part}\end{aligned}$$

Hence, both can complete the work in $\frac{300}{19}$ days.

55. A and B working together can complete a work in 10 days. C alone can complete the same work in 14 days. If A, B and C work together, then how many days will they take to complete three-fifth of the same work?

- (a) 3 days (b) $\frac{7}{2}$ days
 (c) $\frac{7}{3}$ days (d) $\frac{35}{6}$ days

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

Work done by (A+B) in one day = $\frac{1}{10}$ part

Work done by 'C' in one day = $\frac{1}{14}$ part

Work done by (A+B+C) in 1 day = $\frac{1}{10} + \frac{1}{14}$
 $= \frac{7+5}{70}$
 $= \frac{12}{70}$ part

Time taken by (A+B+C) to complete the work = $\frac{70}{12}$

Time taken by (A+B+C) to complete $\frac{3}{5}$ part of the work
 $= \frac{3}{5} \times \frac{70}{12}$
 $= \frac{7}{2}$ days

- 56. Radhika can complete a work in 15 days and Rishi can complete the same work in 30 days. Radhika started the work alone and left after 2 days of work. Then Rishi continued the work. Find the time taken by Rishi to complete the remaining work.**

- (a) 23 days (b) 26 days
(c) 25 days (d) 24 days

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (b) According to the question,

Radhika \rightarrow 15 days $\xrightarrow{2}$
Rishi \rightarrow 30 days $\xrightarrow{1}$ 30 (Total Work)
Two day's work of Radhika = $2 \times 2 = 4$
Time taken the Remaining work done by Rishi
 $= \frac{26}{1} = 26$ days

- 57. A and B can do a piece of work in 45 and 40 days respectively. They began the work together but A left the work after some days and B alone finished the remaining work in 23 days. After how many days did A leave?**

- (a) 12 days (b) 10 days
(c) 11 days (d) 9 days

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (d) : Let A left the work after x days
According to the question,

Total work of A = $\frac{x}{45}$ Part

Total work of B = $\frac{x+23}{40}$ Part

Total work of (A + B) = $\frac{x}{45} + \frac{x+23}{40} = 1$

$$\frac{8x + 9x + 207}{360} = 1$$

$$\frac{17x + 207}{360} = 1$$

$$17x = 360 - 207$$

$$x = \frac{153}{17}$$

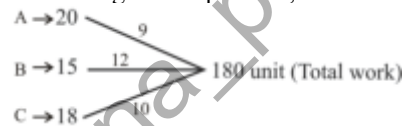
$$x = 9 \text{ days}$$

- 58. A can complete a piece of work alone in 20 days. B can do it alone in 15 days and C can complete it alone in 18 days. B and C started the work together but both were forced to leave after 4 days. The remaining work was done by A in:**

- (a) 12 day (b) $14\frac{2}{45}$ day
(c) $9\frac{2}{45}$ day (d) $10\frac{2}{9}$ day

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (d) : According to the question,



According to the question,

(B+C)'s 4 day's work = $4 \times (10+12) = 4 \times 22 = 88$ unit

Remaining work = $180 - 88 = 92$ unit

Time taken by A to complete remaining work

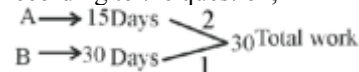
$$= \frac{92}{9} = 10\frac{2}{9} \text{ days}$$

- 59. A can do a certain work in 15 days and B can do one-third of the same work in 10 days. A and B work together for 6 days and then A leaves. B completes the remaining work with C in 8 days A and C together can complete the original work in:**

- (a) 12 days (b) 9 days
(c) 15 days (d) 18 days

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (a) : According to the question,



(A + B)'s 6 day's work = $6 \times 3 = 18$ unit

B's 8 day's work = 8 unit

Remaining work = $30 - (18+8) = 4$ unit

Efficiency of C = $\frac{4}{8} = 0.5$

Time taken by (A + C) to complete the work = $\frac{30}{2.5}$
 $= 12$ days

- 60. X and Y can complete a certain work in 18 days and 30 days respectively. Z is 50% more efficient than Y. Z and Y started the work but both had to leave after 4 days. The remaining work was completed by X with the assistance of P in the next 4 days. P alone can complete the original work in:**

- (a) 9 days (b) 8 days
(c) 10 days (d) 12 days

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (a) :
 $X \rightarrow 18 \text{ days} \rightarrow 5 \text{ unit/day}$
 $Y \rightarrow 30 \text{ days} \rightarrow 3 \text{ unit/day}$
 90 Unit (Total Work)
 \therefore Efficiency of Z = $\frac{3 \times (100 + 50)}{100} = 4.5 \text{ unit/day}$
 According to the question,
 (Z+Y)'s 4 day's work = $(3+4.5) \times 4 = 30 \text{ unit}$
 $\therefore (X+P) \times 4 = \text{Remaining work}$
 $(5+P) \times 4 = 90 - 30$
 $4P = 60 - 20$
 $P = 10 \text{ unit/day}$
 $\therefore P \text{ can complete the original work} = \frac{90}{10} = 9 \text{ days}$

61. A can complete a piece of work in 24 days. He worked for 21 days and then B finished the remaining work in 5 days. In how many days can A and B together finish the work?
 (a) 24 days (b) 40 days
 (c) 15 days (d) 45 days

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : Work done by A in 1 day = $\frac{1}{24}$ part
 Work done by A in 21 days = $\frac{21}{24} = \frac{7}{8}$ part
 Remaining work = $1 - \frac{7}{8} = \frac{1}{8}$
 \therefore Time taken by 'B' to complete the total work = $5 \times 8 = 40 \text{ days}$
 B's one day work = $\frac{1}{40}$ part
 Work done by A and B in one day = $\frac{1}{24} + \frac{1}{40}$
 $= \frac{5+3}{120} = \frac{8}{120} = \frac{1}{15}$ part
 Hence, the time taken by A and B to complete the work = $\frac{1}{\frac{1}{15}} = 15 \text{ days}$.

62. A can complete a piece of work in 60 days. He worked for 15 days and B finished the remaining work in 30 days. If they work together then the work will be completed in:
 (a) 25 days (b) 10 days
 (c) 24 days (d) 12 days

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,
 A's 1 day work = $\frac{1}{60}$ part
 A's 15 days work = $15 \times \frac{1}{60} = \frac{1}{4}$ part
 Remaining work = $1 - \frac{1}{4} = \frac{3}{4}$ part
 Time taken by B to complete $\frac{3}{4}$ part of the work = 30 days

Total time taken by B to complete the whole work = $30 \times \frac{4}{3} = 40 \text{ days}$

Work done by A and B in one day = $\frac{1}{60} + \frac{1}{40} = \frac{1}{24}$ part
 So, A & B together will complete the work in 24 days.

63. A and B can complete a work in 40 days and 60 days respectively. They work together for some days and B leaves the job. If A completes the rest of the work in 10 days, find for how many days B worked.
 (a) 15 days (b) 14 days
 (c) 18 days (d) 16 days

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (c) : A's 1 day work = $\frac{1}{40}$ part
 B's 1 day work = $\frac{1}{60}$ part
 Let-
 B leave the work after working x days, then the work done by B in x days = $\frac{x}{60}$ part
 And work done by A in (x + 10) days = $\frac{x+10}{40}$ part
 Now,
 $\frac{x}{60} + \frac{(x+10)}{40} = 1$
 $\frac{2x+3(x+10)}{120} = 1$
 $2x+3x = 120-30$
 $5x = 90$
 $x = 18$
 Hence, B worked for 18 days.

64. A alone can do a task in 39 days, whereas B alone can do it in 52 days. The duo start working together, but A leaves 3 days before the task gets over. For how many days did they do work together?
 (a) $20\frac{1}{3}$ days (b) $19\frac{2}{7}$ days
 (c) 21 days (d) 20 days

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

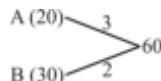
Ans. (c) : Let- A and B can complete the work together in x days.
 According to the question,
 $\frac{x}{39} + \frac{x+3}{52} = 1$
 $\frac{4x+3(x+3)}{156} = 1$
 $7x+9 = 156$
 $x = \frac{147}{7}$
 $x = 21 \text{ days}$

65. A can complete a piece of work in 20 days and B alone can complete the work in 30 days. Due to some other work, A had to leave the work before completion and for the last 5 days B alone did the work. The total time taken to complete the work is:

- (a) 12 days (b) 18 days
(c) 20 days (d) 15 days

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (d) :



A's efficiency = 3

B's efficiency = 2

Work done by B in 5 days = $5 \times 2 = 10$

Remaining work = $60 - 10 = 50$

Time taken by (A+B) to complete the remaining work

$$= \frac{50}{3+2} = 10$$

Total time taken to complete the work = $10 + 5 = 15$ days.

66. A and B can complete a piece of work in 56 and 70 days respectively. They began the work together but A left after some days and B finished the remaining work in 34 days. After how many days did A leave?

- (a) 16 days (b) 12 days
(c) 15 days (d) 9 days

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let A left the work after x days

According to the question,

$$\frac{x}{56} + \frac{x+34}{70} = 1$$

$$5x + 4x + 136 = 280$$

$$9x = 144$$

$$x = 16 \text{ days.}$$

67. A can do a piece of work in 18 days and B can do the same work in 15 days. They started working together but 7 days before the end of the work B left, for how many days did A and B work together?

- (a) 8 days (b) 5 days
(c) 12 days (d) 7 days

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (b) : A's work for one day = $\frac{1}{18}$ part

B's work for one day = $\frac{1}{15}$ part

Let the time taken by A to finish the work = x days

According to the question,

$$\frac{x}{18} + \frac{x-7}{15} = 1$$

$$\frac{5x + 6x - 42}{90} = 1$$

$$11x = 90 + 42$$

$$x = \frac{132}{11}$$

$$x = 12 \text{ days}$$

So, A and B worked together for 5 days.

68. Vicky can complete a piece of work in 40 days. He worked for 8 days, then Gurpreet Singh finished it in 32 days. In how many days can Vicky and Gurpreet Singh together complete the work?

- (a) 25 days (b) 10 days
(c) 15 days (d) 20 days

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : Time taken by Vicky to complete the work in 40 days.

$$= \frac{8}{40} = \frac{1}{5} \text{ part}$$

According to the question,

Remaining work finished by Gurpreet Singh

$$\frac{4}{5} \text{ part} = 32 \text{ days}$$

$$1 \text{ part} = 40 \text{ days}$$

$$\text{Both work together} = \frac{1}{\frac{1}{40} + \frac{1}{40}} = 20 \text{ days.}$$

69. A can do a work in 10 days, B in 15 days and C in 20 days. A and B worked together for 4 days and then C replaced A. In how many days the entire work was finished?

- (a) 16 days (b) 48/7 days
(c) 42/7 days (d) 18/7 days

RRB NTPC 16.04.2016 Shift : 2

Ans : (b) 1 day work of A and B = $\frac{1}{10} + \frac{1}{15} = \frac{1}{6}$ part

$$\therefore 4 \text{ days work of A and B} = \frac{4}{6} = \frac{2}{3} \text{ part}$$

$$\text{Remaining work} = 1 - \frac{2}{3} = \frac{1}{3} \text{ part}$$

$$1 \text{ day work of B and C} = \frac{1}{15} + \frac{1}{20} = \frac{7}{60} \text{ part}$$

$$\therefore \text{Time taken by B and C to complete } \frac{1}{3} \text{ part of work}$$

$$= 1 \times \frac{60}{7} \times \frac{1}{3} = \frac{20}{7} \text{ days}$$

$$\text{Total time} = \frac{20}{7} + 4 = \frac{48}{7} \text{ days}$$

Type - 4

Problems Based on Work Efficiency and Wages etc

70. 12 skilled, 14 semi-skilled and 10 unskilled workers complete a job for ₹13189. If their individual wages be in the ratio of 9:5:4, then the total money (in ₹) earned by 10 unskilled workers is :

- (a) ₹ 3,240 (b) ₹ 2,420
(c) ₹ 2,240 (d) ₹ 3,420

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (b) : The ratio of wages of 12 skilled, 14 semi-skilled and 10 unskilled workers
 $= (12 \times 9) : (14 \times 5) : (10 \times 4) = 108 : 70 : 40$
 Total money earned by 10 unskilled workers
 $= 13189 \times \frac{40}{218}$
 $= ₹ 2420$

71. Sudhir is 4.5 times as efficient as Aarav. If they work together, they can complete a piece of work in 8 days. How many days will Aarav take to do the same work alone?

- (a) 40 days (b) 36 days
 (c) 44 days (d) 48 days

RRB NTPC (Stage-II) –12/06/2022 (Shift-I)

Ans. (c) : Ratio of work capacity
 Sudhi : Aarav = 4.5 : 1
 $= 45 : 10 = 9 : 2$
 Total work = $(9 + 2) \times 8 = 88$ unit
 Then time taken by Aarav Alone to complete the same work
 $= \frac{88}{2} = 44$ days

72. X can do a certain work in 84 days, Y is 50% less efficient than X while Z takes 28 days to do the same work, To complete the work, Y started the work, X joined him after 3 days and Z joined them after 7 days from the beginning. For how many days did Z work to complete the work?

- (a) 15 days (b) 16 days
 (c) 17 days (d) 14 days

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (c) : Work efficiency ratio
 $X : Y = 100 : 50$
 $= 2 : 1$
 Time taken ratio
 $X : Y = 1 : 2$
 According to the question,
 X 1 = 84 days
 Y 2 = $2 \times 84 = 168$ days
 Time taken by Y to complete the work = 168 days
 Given that
 Time taken by Z to complete the work = 28 days

3 day's work of Y = $3 \times 1 = 3$ unit
 4 day's work of (X + Y) = $(2 + 1) \times 4 = 12$ unit
 Remaining work = $168 - (6 + 12) = 168 - 18$
 $= 150$ unit
 150 unit work will be completed by (X + Y + Z).
 Time taken by (X+Y+Z) to complete the 150 unit work
 $= \frac{150}{(2+1+6)} = 17$ days
 Therefore Z did the work for 17 days.

73. A can complete a piece of work in 10 days, B is 25% more efficient than A. How many days will B alone take to complete the same work?

- (a) 7 days (b) 6 days
 (c) 9 days (d) 8 days

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) : A : B { $\therefore 100 : 125 = 4 : 5$ }

Efficiency = 4 : 5

Time 5 : 4

\Rightarrow Time taken by A = 5x (Let)

Time taken by B = 4x

According to the question,

$$\therefore 5x = 10$$

$$x = 2$$

$$\therefore \text{Time taken by B} = 4x$$

$$= 4 \times 2$$

$$= 8 \text{ days}$$

74. A can complete a task in 20 days. B is 75% more efficient than A. The number of days B will take to complete the same work is:

- (a) $10\frac{3}{7}$ days (b) $11\frac{3}{7}$ days
 (c) $1\frac{3}{17}$ days (d) $1\frac{3}{7}$ days

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let, efficiency of A = 100

Then, efficiency of B = 175

Ratio of efficiency of A and B

$$\Rightarrow \frac{A}{B} = \frac{100}{175} = \frac{4}{7}$$

Let B can complete the work in x days.

The ratio of the number of days required by A and B to complete the work

$$\Rightarrow \frac{A}{B} = \frac{20}{x}$$

\therefore Efficiency is inversely proportional to the number of days.

$$\therefore \frac{4}{7} = \frac{x}{20}$$

$$\Rightarrow x = 11\frac{3}{7}$$

Hence, B will complete the same work in $11\frac{3}{7}$ days.

75. A and B can complete a piece of work in 20 days. B and C can complete it in 30 days. A is twice as good as C in completing the work. Find in how many days will B alone complete it.

- (a) 60 days (b) 50 days
 (c) 55 days (d) 65 days

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (a) : One day work of A and B = $\frac{1}{20}$ part

One day work of B and C = $\frac{1}{30}$ part

Let-

A completes the work in x days.

Then, C will do the work in 2x days. (\because A is twice as good as C.)

And B completes the work in y days.

$$\text{Hence, } \frac{1}{x} + \frac{1}{y} = \frac{1}{20} \quad (1)$$

$$\text{And } \frac{1}{2x} + \frac{1}{y} = \frac{1}{30}$$

$$\frac{1}{y} = \frac{1}{30} - \frac{1}{2x} \quad \text{----- (2)}$$

From equation (1) and (2),

$$\frac{1}{x} + \frac{1}{30} - \frac{1}{2x} = \frac{1}{20}$$

$$\frac{1}{x} - \frac{1}{2x} = \frac{1}{20} - \frac{1}{30}$$

$$\frac{1}{2x} = \frac{3-2}{60}$$

$$x = 30$$

By putting the value of x in equation (1),

$$\frac{1}{30} + \frac{1}{y} = \frac{1}{20}$$

$$\frac{1}{y} = \frac{1}{20} - \frac{1}{30}$$

$$\frac{1}{y} = \frac{1}{60}$$

$$y = 60 \text{ days}$$

Hence, B alone will complete the work = y days
= 60 days.

76. A works twice as fast as B. If both of them together can finish a job in 12 days, then how many days will B take to finish the job alone?

- (a) 12 days (b) 48 days
(c) 36 days (d) 24 days

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let A do the work in x days and B do the same work in 2x days.

According to the question,

$$\frac{1}{x} + \frac{1}{2x} = \frac{1}{12}$$

$$\frac{3}{2x} = \frac{1}{12}$$

$$x = 18 \text{ days}$$

Therefore, the work done by B = 2x days
= $2 \times 18 = 36$ days

77. Kamal can complete a work in 14 days. Vimal is 40% more efficient than Kamal. The number of days Vimal will take to complete the same piece of work is:

- (a) 14 days (b) 12 days
(c) 10 days (d) 15 days

RRB NTPC 13.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let, efficiency of Kamal = 100

According to the question,

	Vimal	Kamal
Efficiency \rightarrow	140	100
	7	5
Time \rightarrow	5	7
	$\times 2$	$\times 2$
	10 days	14 days

Hence, the time taken by Vimal to complete the same piece of work = 10 days.

78. A alone can finish a job in 12 days, while B alone can finish it in 15 days. With the help of C, they can finish the same job in 5 days. If they are paid ₹2880 for the whole job, what will be the share of C?

- (a) ₹760 (b) ₹740 (c) ₹720 (d) ₹700

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : A's 1 day work = $\frac{1}{12}$ unit

B's 1 day work = $\frac{1}{15}$ unit

Let C's 1 day work = $\frac{1}{x}$ unit

According to the question,

$$\frac{1}{12} + \frac{1}{15} + \frac{1}{x} = \frac{1}{5}$$

$$\frac{1}{x} = \frac{1}{20}$$

$$\text{Work of A, B and C} = \frac{1}{12} : \frac{1}{15} : \frac{1}{20}$$

$$= 120 \times \frac{1}{12} : 120 \times \frac{1}{15} : 120 \times \frac{1}{20}$$

$$= 10 : 8 : 6$$

$$\text{Hence, share part of C} = \frac{6}{24} \times 2880$$

$$= ₹720$$

79. Anil is twice as efficient as Balu and together, they can complete a task in 12 days. In how many days can Anil alone complete the task?

- (a) 7 days (b) 18 days
(c) 15 days (d) 25 days

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (b) : Suppose Anil complete the task in x days.

Time taken by Balu to complete the task = 2x days

According to the question,

$$\frac{1}{x} + \frac{1}{2x} = \frac{1}{12}$$

$$\frac{2+1}{2x} = \frac{1}{12}$$

$$\frac{3}{2x} = \frac{1}{12}$$

$$2x = 36$$

$$x = 18 \text{ days}$$

80. If Raju is thrice as good workman as Ravi and takes 20 days less than him to complete a piece of work, then find the time taken by Ravi to complete the work:

- (a) 20 days (b) 10 days
(c) 30 days (d) 40 days

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (c) : $\left[\text{Time} \propto \frac{1}{\text{Efficiency}} \right]$

	Raju	Ravi
Work Efficiency \rightarrow	3	1
Time \rightarrow	1	3

(3-1) units = 20
2 units = 20
1 unit = 10
3 units = 30 days

81. Karan works twice as fast as Shyam. Working together, they can complete a task in 20 days. In how many days will Karan alone complete the same task?

- (a) 26 days (b) 32 days
(c) 28 days (d) 30 days

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d)

Karan : Shyam
Efficiency- 2 : 1 [Working efficiency $\propto 1/\text{time}$]
Time - 1 : 2

If two people A and B will do same work together, then the time taken by them = $\frac{A \times B}{A + B}$

Karan and Shyam work together = $\frac{1 \times 2}{3} = \frac{2}{3}$ unit

While both work together in 20 days
Karan alone complete the same task

$$= \frac{20}{\frac{2}{3}} \times \text{Karan's time}$$

$$= \frac{20}{\frac{2}{3}} \times 1$$

$$= \frac{20 \times 3}{2} = 30 \text{ days}$$

82. Rajesh can finish a task in 4 days while Mahesh can finish the same task in 3 days. If both of them finish the task together and get paid ₹350 in total, then find the share of Rajesh –

- (a) ₹ 100 (b) ₹ 140
(c) ₹ 200 (d) ₹ 150

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (d) : One day work of Rajesh = $\frac{1}{4}$ part

One day work of Mahesh = $\frac{1}{3}$ part

Ratio of efficiency = $\frac{1}{4} : \frac{1}{3}$

$$= 3 : 4$$

A T Q,

$$3x + 4x = ₹ 350$$

$$7x = ₹ 350$$

$$x = ₹ 50$$

$$\text{Share of Rajesh} = 3x$$

$$= 3 \times 50$$

$$= ₹ 150$$

83. A alone can complete a work in 10 days and B can complete it in 15 days. A and B undertake the work for ₹4800. With the help of C, they complete the work in 5 days. What amount is to be paid to C?

- (a) ₹800 (b) ₹600
(c) ₹1,200 (d) ₹700

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (a) :

$$\text{Work done by A in one day} = \frac{1}{10} \text{ part}$$

$$\text{Work done by B in one day} = \frac{1}{15} \text{ part}$$

$$\text{Work done by C in one day} = \frac{1}{5} - \left(\frac{1}{10} + \frac{1}{15} \right)$$

$$= \frac{1}{5} - \left(\frac{3+2}{30} \right)$$

$$= \frac{1}{5} - \frac{5}{30}$$

$$= \frac{1}{5} - \frac{1}{6}$$

$$= \frac{6-5}{30}$$

$$= \frac{1}{30} \text{ part}$$

$$\text{Efficiency ratio} = \frac{1}{10} : \frac{1}{15} : \frac{1}{30}$$

$$= 3 : 2 : 1$$

$$\text{Amount paid to C} = \frac{4800 \times 1}{6} = ₹800$$

84. A and B together can do a work in 40 days. The ratio of their working rate is 8:5 In how many days will A alone complete the same work.

- (a) 65 days (b) 40 days
(c) 72 days (d) 104 days

RRB NTPC 02.04.2016 Shift : 1

RRB NTPC 29.04.2016 Shift : 3

Ans : (a) Let A and B can complete work separately in 5x and 8x days respectively.

$$\therefore \text{Work done by both in 1 day} = \frac{1}{40} \text{ part}$$

According to the question,

$$\frac{1}{5x} + \frac{1}{8x} = \frac{1}{40}$$

$$\frac{13}{40x} = \frac{1}{40}$$

$$x = 13$$

\therefore A will complete that work alone in 65 days.

85. 5 women can do a work in 36 days. If the ratio of the efficiency of a man and a woman is 3:1, then find how many days will take 5 men to complete the same work?

(a) 12 days (b) 15 days
(c) 18 days (d) 108 days

RRB NTPC 18.04.2016 Shift : 1

Ans : (a) Given-

	man	woman	
Ratio of efficiency	3	1	$\left\{ \because \text{Efficiency} \propto \frac{1}{\text{time}} \right\}$
\therefore Ratio of time	1	3	
\therefore 5 women can complete the work in		36 days	
\therefore Time taken by 5 men to complete the work	$36 \times \frac{1}{3}$		
	= 12 days		

86. Carpenters A and B work together then they can complete a work in 10 days. Carpenter A is twice faster than carpenter B. If carpenter B works alone, how long will he take to complete this work?

(a) 30 days (b) 15 days
(c) 20 days (d) 10 days

RRB NTPC 29.04.2016 Shift : 1

Ans : (a) Efficiency ratio of carpenter A and carpenter B = 2:1

Let time taken by A and B is x and 2x days respectively.

\therefore Ratio of time = 1: 2

According to the question,

$$\frac{1}{x} + \frac{1}{2x} = \frac{1}{10} \quad \left[\text{Time} \propto \frac{1}{\text{Efficiency}} \right]$$

$$\frac{2+1}{2x} = \frac{1}{10}$$

$$\frac{3}{2x} = \frac{1}{10}$$

$$2x = 30$$

$$x = 15$$

$$x = 15 \text{ days}$$

$$2x = 15 \times 2 = 30 \text{ days}$$

87. Together Rahul and Raghav can pluck 260 flowers in 1 hour. Their flower plucking efficiency are in the ratio of 8:5 Find the number of flowers to be plucked by Raghav.

(a) 100 (b) 130
(c) 78 (d) 80

RRB NTPC 30.04.2016 Shift : 1

Ans : (a) Efficiency ratio of Rahul and Raghav = 8:5

Number of flowers plucked by Raghav

$$= 260 \times \frac{5}{13} = 100$$

88. Amrit has twice capacity of painting than Kushal. Together they complete a work in 6 days. In how many days Kushal will complete that work alone?

(a) 10 days (b) 12 days
(c) 24 days (d) 18 days

RRB NTPC 17.01.2017 Shift-3

Ans : (d) Efficiency ratio of Amrit and Kushal = 2 : 1

\therefore Ratio of time = 1 : 2

Let the time taken by Amrit and Kushal to finish the work is x and 2x days respectively.

According to the question-

$$\frac{x \times 2x}{x + 2x} = 6$$

$$\frac{2x^2}{3x} = 6 \Rightarrow x = \frac{6 \times 3}{2}$$

$$x = 9 \text{ days}$$

So time taken by Kushal to complete the work = $9 \times 2 = 18$ days

89. Himanshu is twice as capable as Ankit as a wood cutter and together they finish a work in 16 days. In how many days will Ankit alone complete the same work?

(a) 32 days (b) 48 days
(c) 64 days (d) 40 days

RRB NTPC 26.04.2016 Shift : 3

Ans : (b) Let Ankit complete the work in 2x days and Himanshu in x days.

According to the question,

$$\frac{1}{x} + \frac{1}{2x} = \frac{1}{16}$$

$$\frac{2+1}{2x} = \frac{1}{16}$$

$$2x = 48$$

$$x = 24$$

Hence, time taken by Ankit to complete the work (2x) = $24 \times 2 = 48$ days

90. As a sailor, Anirudh is twice as fast as Ashwin and together they finish a work in 14 days. In how many days Ashwin alone can complete the work.

(a) 28 days (b) 42 days
(c) 56 days (d) 35 days

RRB NTPC 30.04.2016 Shift : 3

Ans : (b) Let Anirudh and Ashwin finish the work in x days and 2x days respectively.

Then one day work of Anirudh = $\frac{1}{x}$ part

And one day work of Ashwin = $\frac{1}{2x}$ part

According to the question,

$$\text{Then } \frac{1}{x} + \frac{1}{2x} = \frac{1}{14} \text{ part}$$

$$\frac{2+1}{2x} = \frac{1}{14}$$

$$\frac{3}{2x} = \frac{1}{14}$$

$$x = 21$$

So time taken by Ashwin alone can complete the work = $2x = 2 \times 21 = 42$ days

91. Ishan is twice as good as a worker as Kamal and both together finish a work in 29 days. In how many days will Kamal alone can do this work.

- (a) 58 days (b) 70 days
(c) 87 days (d) 116 days

RRB NTPC 17.01.2017 Shift-1

Ans : (c) Let Kamal do the work in x days

And Ishan do that work in $\frac{x}{2}$ days

According to the question,

Work done by both in a day =

$$\frac{1}{x} + \frac{2}{x} = \frac{1}{29}$$

$$\frac{3}{x} = \frac{1}{29}$$

$$x = 29 \times 3$$

$$x = 87 \text{ days}$$

So, Kamal will complete that work 87 days

92. Raju is thrice as good as a workmen as Vinod and together they can finish a task in 21 days. In how many days can Vinod alone complete the work?

- (a) 84 days (b) 28 days
(c) 78 days (d) 76 days

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let time taken by Raju to complete the work = x days

Time taken by Vinod to complete the work = $3x$ days

1 day work of Raju and Vinod = $\frac{1}{21}$ unit

Raju's 1 day work + Vinod's 1 day work = $\frac{1}{21}$ unit

$$\frac{1}{x} + \frac{1}{3x} = \frac{1}{21}$$

$$\frac{3+1}{3x} = \frac{1}{21}$$

$$\Rightarrow x = 28 \text{ days}$$

\therefore Time taken by Raju to complete the work = 28 days.

\therefore Time taken by Vinod to complete the work = 3×28 = 84 days

93. Shweta and Harish completed a project with an income of ₹28,000. In this project Shweta worked for 20 days and Harish worked for 30 days. If their daily wages are in the ratio of 5 : 6, then Shweta's share is:

- (a) ₹ 12,000 (b) ₹ 16,000
(c) ₹ 10,000 (d) ₹ 18,000

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (c) : Ratio of work done by Shweta & Harish

$$= 20 \times 5 : 30 \times 6$$

$$= 100 : 180$$

$$= 5 : 9$$

And sum of shares of Shweta and Harish = $5 + 9 = 14$

$$\text{Shweta's share} = 28000 \times \frac{5}{14}$$

$$= 2000 \times 5$$

$$= ₹ 10,000$$

Type - 5 Miscellaneous

94. A father can complete a task in 8 days, while the son can do it in 7 days. If they work on alternate days, with the father starting, then in how many days will the task be completed?

- (a) $7\frac{1}{2}$ days (b) 6 days
(c) 7 days (d) $6\frac{1}{2}$ days

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (a) : Father's 1 day work = $\frac{1}{8}$ th part

Son's 1 day work = $\frac{1}{7}$ th part

$$(\text{Father} + \text{Son})'s \text{ two days work} = \frac{1}{8} + \frac{1}{7} = \frac{15}{56}$$

$$(\text{Father} + \text{Son})'s 2 \times 3 \text{ days work} = \frac{15}{56} \times 3 = \frac{45}{56}$$

$$\text{Remaining work} = 1 - \frac{45}{56} = \frac{11}{56}$$

The remaining work after the work done by the father on 7th day

$$= \frac{11}{56} - \frac{1}{8} = \frac{4}{56} = \frac{1}{14}$$

\therefore On 8th day son will do $\frac{1}{14}$ of the work in $\frac{1}{2}$ day

$$\therefore \text{Total time} = 7 + \frac{1}{2} = 7\frac{1}{2} \text{ days.}$$

95. Four persons A, B, C and D completed a task in $\frac{2}{3}$ h, $\frac{3}{4}$ h, $\frac{4}{5}$ h and $\frac{1}{5}$ h respectively. Who among the following took the highest amount of time to complete the task?

- (a) D (b) C
(c) A (d) B

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (b) According to the question,

$$\text{Time taken by A to complete the task} = \frac{2}{3} \text{ h} = 0.67 \text{ h}$$

$$\text{Time taken by B to complete the task} = \frac{3}{4} \text{ h} = 0.75 \text{ h}$$

$$\text{Time taken by C to complete the task} = \frac{4}{5} \text{ h} = 0.8 \text{ h}$$

$$\text{Time taken by D to complete the task} = \frac{1}{5} \text{ h} = 0.2$$

It is clear that C has taken the highest amount of time.

96. A can do $\frac{1}{5}$ of some work in 12 days, B can do 20% of the same work in 10 days, C can do $\frac{1}{6}$ of the work in 8 days and D can do $\frac{1}{5}$ of the work in 12 days. Who will complete the work first if all four started to work at the same time?
- (a) C (b) B
(c) A (d) D

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,
Time taken by A to complete the work
 $= \frac{12}{\frac{1}{5}} = 12 \times 5 = 60$ days

And time taken by B to complete the work
 $= \frac{10}{20\%} = \frac{10}{\frac{1}{5}} \times 100 = 50$ days

Same as time taken by C $= \frac{8}{\frac{1}{6}} = 8 \times 6 = 48$ days

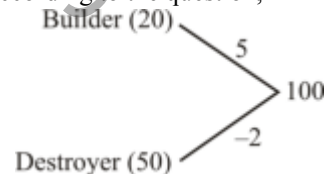
And time taken by D to complete the work $= \frac{12}{\frac{1}{5}} = 12 \times 5 = 60$ days

\therefore C took minimum time to complete the work
 \therefore C will complete the work first.

97. In a computer game, a builder can build a wall in 20 hours, while a destroyer can completely demolish the wall in 50 hours. Both builder and destroyer were initially set to work on level ground. But after 30 hours the destroyer was taken out. How long did it take to build the wall?
- (a) 32 hours 40 minutes
(b) 33 hours 20 minutes
(c) 32 hours 20 minutes
(d) 32 hours

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,



Work done by Builder and Destroyer in 1 hour $= 5 - 2 = 3$.

Work done by Builder and Destroyer in 30 hours $= 3 \times 30 = 90$

Remaining work $= 100 - 90 = 10$

Time taken by the Builder to complete the remaining work $= \frac{10}{3} = 2$ hours

Total time $= 30 + 2 = 32$ hours

98. A man can complete a work in 5 days working 4 hours per day in the first 5 days, 5 hours per day in the next 5 days and 6 hours per day in the last 5 days. If he works 8 hours a day with half an hour launch break, in how many days will he complete the work?

- (a) 7.5 days (b) 12 days
(c) 10 days (d) 8 days

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

Total work $= 5 \times 4 + 5 \times 5 + 5 \times 6$
 $= 75$ units

After half an hour break $= 8$ hours $- 30$ min
 $= 7 : 30$ hours

According to the question,

$$75 = 7.5 \times D$$

$$D = 10 \text{ days}$$

99. A can complete 25% of a task in 10 days. B can complete 40% of the task in 40 days and C can complete $\frac{1}{3}$ of the task in 13 days. Who among them has the fastest speed to complete the same task?

- (a) C (b) All have the same speed
(c) B (d) A

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (a) : Time taken by A to complete $\left(\frac{1}{4}\right)^{\text{th}}$ part of work $= 10$ days

\therefore Time taken by A to do total work $= 4 \times 10 = 40$ days

\therefore Time taken by B to complete $\left(\frac{2}{5}\right)^{\text{th}}$ part of work $= 40$ days

\therefore Time taken by B to do total work $= 40 \times \frac{5}{2} = 100$ days

\therefore Time taken by C to do $\left(\frac{1}{3}\right)^{\text{th}}$ part of work $= 13$ days

\therefore Time taken by C to do total work $= 3 \times 13 = 39$ days
So, it is clear that C has the fastest speed to complete the same task.

100. The bill for a satellite airtime for 2 minutes 30 seconds is Rs. 25, then what will be the price of 3 minutes 20 seconds in rupees? (up to one decimal place)

- (a) ₹ 33.3 (b) ₹ 33.2
(c) ₹ 33.4 (d) ₹ 33.1

RRB NTPC 07.04.2016 Shift : 1

Ans : (a) 2 minutes 30 seconds or $(120 + 30)$ seconds.
The bill of 150 sec $= 25$

The bill 1 second $= \frac{25}{150} = \frac{1}{6}$

Then

3 minutes 20 seconds $= 180 + 20 = 200$ seconds

The bill of 200 seconds $= \frac{1}{6} \times 200 = \frac{100}{3} = ₹ 33.33$

Type - 1

Simple Based on The Value and Quantity of Substances in a Mixture

1. How much water should be added to 90 ml of a 38% sugar solution so that it becomes a 17.1% sugar solution?

- (a) 81 ml (b) 95 ml
(c) 110 ml (d) 100 ml

RRB NTPC (Stage-II) –13/06/2022 (Shift-I)

Ans. (c) : Total quantity of the initial mixture = 90 ml
Quantity of sugar in the mixture of 90 ml

$$= 90 \times \frac{38}{100} = 34.2 \text{ ml}$$

According to the question,

$$17.1\% = 34.2$$

$$1\% = 2$$

$$100\% = 200$$

Total quantity of new mixture = 200 ml

Required amount of water to be added = 200 – 90
= 110 ml

2. In a mixture of 90 litres, the ratio of milk to water 4 : 1, In another mixture of 90 litres, the ratio of milk to water is 3 : 2, What is the positive difference between the quantities of milk in the two mixtures ?

- (a) 22 litres (b) 18 litres
(c) 23 litres (d) 16 litres

RRB NTPC (Stage-II) –12/06/2022 (Shift-I)

Ans. (b) : Amount of milk in 1st mixture-

$$90 \times \frac{4}{5} = 72 \text{ litre}$$

Amount of milk in second mixture

$$90 \times \frac{3}{5} = 54 \text{ litre}$$

∴ Required difference = (72 – 54) = 18 litres

3. A shopkeeper mixes 30 kg of rice which he purchased at ₹30/kg and 40 kg of rice which he purchased at ₹28/kg and he sells the entire mixture at ₹28/kg. What is the profit or loss percentage (approximated to nearest integer)?

- (a) 7% profit (b) 6% loss
(c) 3% loss (d) 5% profit

RRB NTPC (Stage-II) –12/06/2022 (Shift-I)

Ans. (c) : Cost price of rice : Selling price of rice

$$(30 \times 30 + 28 \times 40) : 28 \times (30 + 40)$$

$$(900 + 1120) : 28 \times 70$$

$$(90 + 112) : 196$$

$$202 : 196$$

$$\Rightarrow \text{CP} : \text{SP} = 101 : 98$$

$$\text{Loss \%} = \frac{3}{101} \times 100 = 2.97 \approx 3\%$$

4. Out of 10 liters of solution, 2 liters of water is evaporated. The remaining solution contains 6% salt. What is the amount of salt percentage in the original solution ?

- (a) 4.8% (b) 5.6%
(c) 5% (d) 5.4%

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (a) : Amount of solution = 10 litres

According to question, amount of salt in solution =

$$(10 - 2) \times \frac{6}{100}$$

$$= \frac{48}{100} = 0.48 \text{ litres}$$

Amount of salt in the original solution (in %)

$$= \frac{0.48}{10} \times 100 = 4.8\%$$

5. If mixture contains acid and alcohol in the ratio 3 : 2. On adding 10 ltr of alcohol to this mixture, the ratio of acid to alcohol becomes 3 : 5. What was the amount of acid (in ltr) in original mixture.

- (a) 10 (b) 5.5
(c) 5 (d) 4.5

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (a) : Let the quantity of acid in the original mixture = 3x litres

Quantity of alcohol in the original mixture = 2x litres

According to question –

On adding 10 litres of alcohol to the mixture

$$\frac{3x}{2x + 10} = \frac{3}{5}$$

$$15x = 6x + 30$$

$$9x = 30$$

$$x = \frac{10}{3}$$

Hence the quantity of acid in the original mixture = 3x

$$= 3 \times \frac{10}{3}$$

$$= 10 \text{ litres}$$

6. A liquid mixture contains $\frac{1}{5}$ part acid, $\frac{3}{5}$ part alcohol and rest is water. If the total mixture is 20 ltr, find the amount of water (in ltr).
 (a) 12 (b) 8
 (c) 4 (d) 15

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (c) :

Let, the total amount of the mixture be x liters

The amount of acid in the mixture = $\frac{x}{5}$ part

The amount of alcohol in the mixture = $\frac{3x}{5}$ part

Then amount of water in the mixture

$$= x - \left(\frac{x}{5} + \frac{3x}{5} \right) = \frac{x}{5} \text{ part}$$

According to question –

$$\frac{x}{5} + \frac{3x}{5} + \frac{x}{5} = 20$$

$$\frac{5x}{5} = 20$$

$$x = 20 \text{ litres}$$

Hence, the amount of water in the mixture

$$= \frac{x}{5} = \frac{20}{5} = 4 \text{ litres.}$$

7. The ratio of water and milk in a 72 L of mixture is 4 : 5. Then what amount of milk is to be added to this mixture is make the ratio 3 : 6?
 (a) 24 L (b) 12 L
 (c) 72 L (d) 36 L

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question-

$$\frac{W}{M} = \frac{4}{5} \Rightarrow W = \frac{4}{5}M$$

$$W + M = 72$$

$$\frac{4}{5}M + M = 72$$

$$\frac{9M}{5} = 72$$

$$M = 40 \text{ litres}$$

$$\text{then } W = 32 \text{ litres}$$

Let x liters amount of milk to be added to this mixture

$$\frac{32}{40+x} = \frac{3}{6}$$

$$32 \times 6 = 120 + 3x$$

$$72 = 3x$$

$$x = 24 \text{ litres}$$

Hence, 24 litres of milk has to be added to the mixture.

8. How much of an 80% orange juice drink must be mixed with 36 litres of a 25% concentration orange juice drink to concentration obtain a mixture that has 60% orange juice?
 (a) 63 litres (b) 60 litres
 (c) 40 litres (d) 72 litres

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

$$\text{Ans. (a) : Quantity of Juice} = \frac{36 \times 25}{100} = 9 \text{ litres}$$

Let us consider x litre juice of 80% concentration is mixed.

$$\therefore \text{Quantity of Juice} = \frac{x \times 80}{100} = \frac{4x}{5}$$

$$\text{According to question, } 9 + \frac{4x}{5} = (36+x) \frac{60}{100}$$

$$\left(\frac{45+4x}{5} \right) \times 10 = 216 + 6x$$

$$90 + 8x = 216 + 6x$$

$$2x = 126$$

$$\therefore x = 63 \text{ litres}$$

9. A sample of milk from a vessel contains 4% water. What quantity of pure milk should be added to 8 L of milk in the vessel to reduce the water content to 2%?
 (a) 7 L (b) 7.5 L
 (c) 8 L (d) 6.5 L

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let m liters of pure milk be added to 8 liters sample of milk.

The amount of water added to the new milk will be equal to the amount of water in initial milk.

$$8 \times 4\% = (8+m)2\%$$

$$32 = 16 + 2m$$

$$2m = 32 - 16$$

$$2m = 16$$

$$m = 8$$

Hence, the amount of pure milk to be added is 8 litres.

10. A mixture contains alcohol and water in the ratio of 5 : 4. If 9 liters of water is added to the mixture, the ratio of alcohol to water becomes 4 : 5. Find the quantity of alcohol in the mixture.
 (a) 16 liters (b) 24 liters
 (c) 28 liters (d) 20 liters

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : Let quantity of alcohol is 5x liters and quantity of water is 4x liters in the mixture.

According to the question,

$$\frac{5x}{4x+9} = \frac{4}{5}$$

$$25x = 16x + 36$$

$$9x = 36$$

$$x = 4$$

Hence, quantity of alcohol = $5x = 4 \times 5 = 20$ liters

11. In a bucket, milk and water are mixed in the ratio 2 : 1. If the ratio of milk to water is to be 1 : 2, the quantity of water to be added to the mixture is:

- (a) $\frac{1}{3}$ of the bucket. (b) One full bucket.
(c) $\frac{1}{4}$ of the bucket. (d) Half of the bucket.

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let x liters of water be mixed in the bucket.

According to the question,

$$\frac{2}{1+x} = \frac{1}{2}$$

$$1+x = 4$$

$$x = 3$$

Hence, $\frac{\text{Added amount of water}}{\text{Initial total quantity}} = \frac{3}{2+1} = \frac{3}{3} = 1$

∴ A full bucket of water was mixed.

12. 30 litres of salt solution contains 5% salt. How many litres of water must be added so as to get a resulted solution containing 3% salt?

- (a) 20 l (b) 25 l
(c) 30 l (d) 35 l

RRB NTPC 16.04.2016 Shift : 3

Ans : (a)

Quantity of salt in 30l solution = $30 \times \frac{5}{100} = \frac{3}{2} = 1.5$

Suppose quantity of mixed water be x l
from the question-

$$(30+x) \times \frac{3}{100} = 1.5$$

$$30+x = 50 \Rightarrow x = 20 \text{ l}$$

13. If 140 g brass is mixed with copper to prepare an alloy having brass and copper in the ratio 4 : 3 then how much copper has been taken to prepare the alloy?

- (a) 60 g (b) 245 g
(c) 105 g (d) 80 g

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to question,

$$\frac{\text{Brass}}{\text{Copper}} = \frac{4}{3}$$

$$\frac{140}{\text{Copper}} = \frac{4}{3}$$

$$\text{Copper} = \frac{140 \times 3}{4} = 105\text{g}$$

14. Initially the ratio of sand and cement in a mixture was 9 : 2. After adding 20 kg of sand and 10 kg of cement to the mixture, the ratio of sand and cement becomes 4 : 1. What was the initial amount of cement in the mixture?

- (a) 50 kg (b) 40 kg
(c) 20 kg (d) 30 kg

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (b) : Let the initial quantity of cement = 2x kg

and quantity of sand = 9x kg

According to the question-

$$\frac{9x+20}{2x+10} = \frac{4}{1}$$

$$9x+20 = 8x+40$$

$$x = 20 \text{ kg}$$

So, the initial quantity of cement = 2x = 2 × 20 = 40 kg

Type - 2 Problems Based on Finding Ratio of Substances in a Mixture

15. 2 litres of a liquid having milk and water in the ratio 3 : 2 is mixed with 3 litres of a liquid having milk and water in the ratio 2 : 3. Find the ratio of milk to water in the new mixture.

- (a) 1 : 1 (b) 12 : 13
(c) 5 : 6 (d) 9 : 4

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : Quantity of water and milk-

In 2 litre of liquid

- quantity of milk = $2 \times \frac{3}{5} = \frac{6}{5}$ litre
- quantity of water = $2 \times \frac{2}{5} = \frac{4}{5}$ litre

In 3 litre of liquid

- quantity of milk = $3 \times \frac{2}{5} = \frac{6}{5}$ litre
- quantity of water = $3 \times \frac{3}{5} = \frac{9}{5}$ litre

$$\therefore \text{Required ratio} = \frac{\frac{6}{5} + \frac{6}{5}}{\frac{4}{5} + \frac{9}{5}} = \frac{12}{13} = 12 : 13$$

16. In a blend of apple juice and orange juice, 20% was apple juice. In another blend of the two juices, 30% was orange juice. The two blends are mixed in a certain ratio of apple juice and orange juice in the mix was 4:3. Find the ratio of the first blend and the second blend, in that order in the final mix.

- (a) 10:29 (b) 5:14
(c) 2:7 (d) 9:26

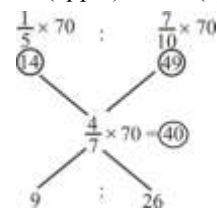
RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (d) :

Mixture I	Mixture II
Apple : Orange	Apple : Orange
20% : 80%	70% : 30%
1 : 4	7 : 3

According to the question,

M_I (apple) M_{II} (apple)



Hence, required ratio = 9 : 26

17. The ratio of milk and water in two vessels is 2:3 and 7:3. Find the ratio of milk and water in the new mixture obtained by mixing the mixture of both the vessels pots (in the third new vessels).

- (a) 2:1 (b) 11:9
(c) 3:2 (d) 2:3

RRB NTPC 19.04.2016 Shift : 1

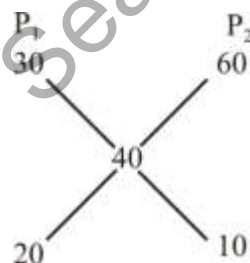
Ans : (b) Required ratio = $\left(\frac{2}{5} + \frac{7}{10}\right) : \left(\frac{3}{5} + \frac{3}{10}\right)$
 $= \frac{11}{10} : \frac{9}{10} = 11:9$

18. In what ratio should 30% potassium nitrate solution be mixed with 60% potassium nitrate solution to get result as solution becomes 40% potassium nitrate in the solution.

- (a) 2:1 (b) 3:1
(c) 1:3 (d) 4:5

RRB NTPC 18.04.2016 Shift : 2

Ans : (a) According to the question-



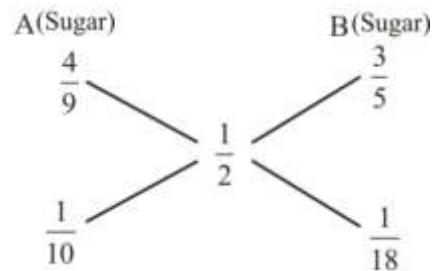
∴ Required ratio = 20 : 10 = 2 : 1

19. Two vessels A and B contain a mixture of sugar and water in the ratio 4:5 and 3:2. In what ratio can these two mixtures be mixed to obtain a new mixture of half sugar and half water.

- (a) 2 : 3 (b) 9 : 5
(c) 7 : 5 (d) 2 : 7

RRB NTPC 22.04.2016 Shift : 3

Ans : (b) According to the question-



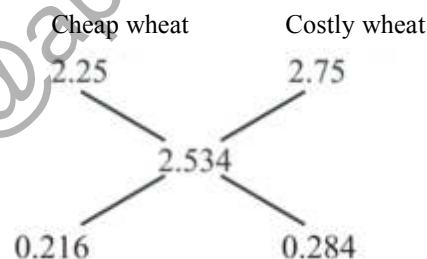
Required ratio = $\frac{1}{10} : \frac{1}{18} = 9 : 5$

20. In what ratio should a grocer mix wheat at Rs. 2.25 per kg and Rs. 2.75 per kg so that the obtained mixture becomes (approximately) Rs. 2.534 per kg.

- (a) 2:3 (b) 3:2
(c) 5:3 (d) 3:4

RRB NTPC 18.04.2016 Shift : 3

Ans : (d) According to the question,



Required ratio = 0.216 : 0.284

$= \frac{216}{284} = \frac{54}{71}$
 $\approx \frac{54}{72} = \frac{3}{4} = 3 : 4$

21. In what ratio should Darjeeling tea costing Rs. 400 per kg be mixed with Assam tea costing Rs. 300 per kg so that by selling the mixture at Rs. 408 per kg there is a profit of 20%.

- (a) 1 : 2 (b) 2 : 3
(c) 2 : 5 (d) 1 : 6

RRB NTPC 16.04.2016 Shift : 1

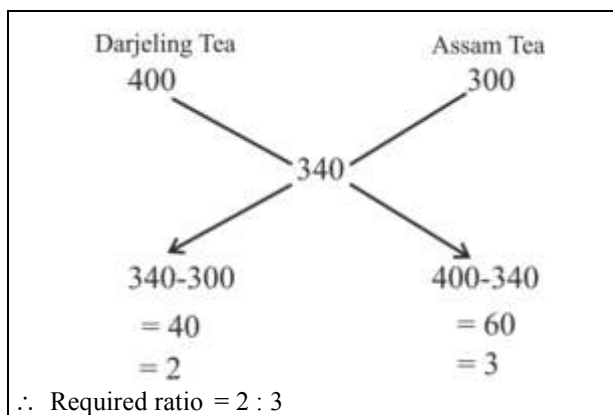
Ans : (b) Selling price of tea = Rs. 408 per kg
and profit = 20%

So cost price of tea per kg = $\frac{\text{selling price}}{100 + \text{profit \%}} \times 100$

$= \frac{408}{100 + 20} \times 100 = \frac{408}{120} \times 100$

= Rs. 340 per kg

From the rule of alligation,

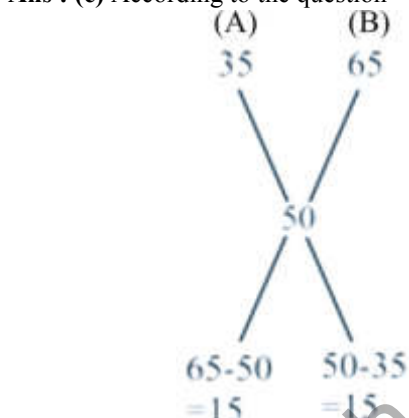


22. Quality A and B, rice costing Rs. 35 per kg and Rs. 65 per kg respectively are mixed. The new average cost of the mixture obtained is Rs. 50 per kg. the ratio of the quantity of A and B in the mixture will be:

- (a) 1:2 (b) 1:3
(c) 1:1 (d) 1:5

RRB NTPC 12.04.2016 Shift : 2

Ans : (c) According to the question-



$$\frac{\text{quantity of A}}{\text{quantity of B}} = \frac{15}{15}$$

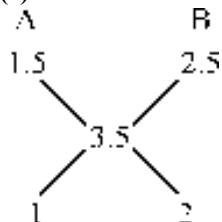
Hence, the required ratio = 1:1

23. The amount of alcohol in two different medicines is 1.5% and 2.5%. In what ratio they should be mixed so that the amount of alcohol in the new obtained mixture is 3.5%

- (a) 1 : 2 (b) 2 : 1
(c) 3 : 2 (d) 2 : 3

RRB NTPC 12.04.2016 Shift : 3

Ans : (a) From the rule of alligation,



Hence, the required ratio = 1 : 2

24. The acid and water in the two containers are mixed in the ratio is 3:1 and 5:3 respectively. In order to get a new mixture in which the ratio of acid and water is 2:1, what should be the ratio of both the types of mixture?

- (a) 1:2 (b) 2:1
(c) 2:3 (d) 3:2

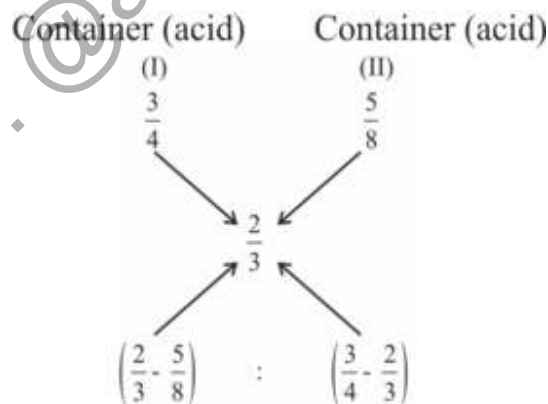
RRB NTPC 22.04.2016 Shift : 1

Ans : (a) Acid in first container = $\frac{3}{1+3} = \frac{3}{4}$

Acid in second container = $\frac{5}{3+5} = \frac{5}{8}$

Acid in new mixture = $\frac{2}{1+2} = \frac{2}{3}$

According to the question,



$$= \frac{1}{24} : \frac{1}{12} = 1:2$$

25. Two alloys P and Q are made by mixing silver and Aluminium metals in the ratio of 5:3 and 7:9 respectively. If the equal quantity of both alloy are melt to form a new alloy R, then what will be the ratio of silver and aluminium in R?

- (a) 17 : 15 (b) 15 : 17
(c) 13 : 17 (d) 17 : 13

RRB NTPC 22.04.2016 Shift : 3

Ans : (a) Ratio of Silver and Aluminium in new alloy R

$$= \left[\frac{5}{8} + \frac{7}{16} \right] : \left[\frac{3}{8} + \frac{9}{16} \right] = \frac{17}{16} : \frac{15}{16} = 17 : 15$$

Type - 3 Miscellaneous

26. A metallic part of a machine is made from a mixture of copper, zinc and lead mixed in the ratio of 13 : 6 : 1. If the weight of zinc in this part is 90 kg, then the total weight of the part will be:

- (a) 285 kg (b) 195 kg
(c) 210 kg (d) 300 kg

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (d) : Let weight of copper in metallic part = $13x$

Weight of zinc in metallic part = $6x$

Weight of lead in metallic part = x

According to question

$$6x = 90 \text{ kg}$$

$$x = 15 \text{ kg}$$

Hence, Total weight = $13x + 6x + x$

$$= 20x$$

$$= 20 \times 15$$

$$= 300 \text{ kg}$$

27. Gold and silver are melted together in the ratio 8:12. If 30 kg of gold is consumed then find the weight of the melted mixture.

- (a) 58 kg (b) 60 kg (c) 710 kg (d) 75 kg

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d) : The ratio of Gold and Silver melted together = 8 : 12 (Given)

Let, the weight of gold and silver are $8x$ kg and $12x$ kg respectively.

As per question,

The amount of gold $8x = 30$ kg

$$x = \frac{30}{8} \text{ kg}$$

Total weight of melted mixture = $8x + 12x = 20x$

$$= 20 \times \frac{30}{8} = 75 \text{ kg}$$

28. A container contains 80 litres of milk. From this container, 8 litres of milk is taken out and replaced by water. 8 litres of this mixture is now taken out and again replaced with water. This process is repeated once more. How much milk content in the mixture now?

- (a) 58.32 litres (b) 52.12 litres
(c) 50.42 litres (d) 48.32 litres

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (a) :

$$\text{Amount of milk present in the mixture} = \left(1 - \frac{x}{y}\right)^n \times y$$

Where, n = Number of repetition

x = Amount to be replaced at a time

y = Total amount of milk

\therefore Amount of milk present in the mixture

$$= 80 \left(1 - \frac{8}{80}\right)^3 = \frac{8 \times 9 \times 9 \times 9}{100} = 58.32 \text{ liters}$$

29. A tea trader has 3 varieties of tea to sell. Brand A was sold at the rate of Rs. 252 per kg, brand B at Rs. 280 per kg and brand C at Rs. 316 per kg. At the end of the year he finds that now he has 274 kg of brand A, 197 kg of brand B and 54 kg of brand C. He mixes all three and sells the mixture at the rate of Rs. 283.50 per kg. What was his profit or loss on the sale?

- (a) Rs. 7565.50 profit (b) Rs. 7565.50 loss
(c) Rs. 8232.40 profit (d) Rs. 8125.30 loss

RRB NTPC 28.04.2016 Shift : 1

Ans : (a) Total selling price of brand A, B and C

$$= 252 \times 274 + 280 \times 197 + 316 \times 54$$

$$= 69048 + 55160 + 17064 = 141272$$

New selling price of brand A, B and C

$$= (274 + 197 + 54) \times 283.50$$

$$= 525 \times 283.50 = 148837.5$$

So total profit on the sale = $148837.5 - 141272$

$$= \text{Rs. } 7565.50$$

30. There is 6% of sugar in the 5 litres mixture of sugar, out of which 1 litre of water vaporises. Find the percentage of sugar in this mixture.

- (a) 5% (b) 7.5%
(c) 6% (d) 4%

RRB NTPC 28.03.2016 Shift : 3

Ans : (b) Quantity of sugar = $\frac{5 \times 6}{100} = 0.3$

After vaporisation of 1l of water remaining mixture = 4 litres

Percentage of sugar in remaining mixture

$$= \frac{0.3}{4} \times 100 = 7.5\%$$

13.

Pipe & Cistern

Type - 1 Simple Problems Based on Pipe and Cistern

1. Pipe 1 can empty a tank in 6 h while pipe 2 can do so in 18 h. If both are working together, in how much time they will empty the full tank?

- (a) 10 h (b) 5 h
(c) 9 h (d) 4.5 h

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) :

Part of tank emptied by pipe 1 in one hour = $\frac{1}{6}$ part

Part of tank emptied by pipe 2 in one hour = $\frac{1}{18}$ part

Part of tank emptied by both the pipe together = $\frac{1}{6} + \frac{1}{18}$

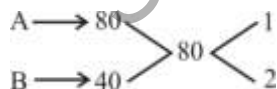
Hence, the time taken to empty the full tank = $\frac{18}{4} = 4.5$ hours

2. Pipe A can fill a tank in 80 minutes and pipe B can fill the tank in 40 minutes. If A and B are opened together, then in how many minutes will the tank be filled?

- (a) $26\frac{1}{3}$ (b) $26\frac{2}{3}$
(c) 27 (d) 26

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,



Time taken by A & B to fill the tank = $\frac{80}{3}$
= $26\frac{2}{3}$ minutes

3. There are two holes in a water tank. Hole 1 alone takes 9 minutes to empty the tank and hole 2 alone can empty the tank in 6 minutes. If the water leakage is at a constant rate, then in how many minutes will the tank be emptied when both holes are working simultaneously.

- (a) $3\frac{3}{5}$ (b) $\frac{3}{5}$
(c) $3\frac{1}{5}$ (d) $3\frac{2}{5}$

RRB NTPC 17.01.2017 Shift-1

Ans : (a) Part emptied by hole- 1 in 1 minute = $\frac{1}{9}$

Part emptied by hole-2 in 1 minute = $\frac{1}{6}$

Part of the tank emptied by hole-1 and hole-2 in 1 minute

$$= \frac{1}{9} + \frac{1}{6} = \frac{2+3}{18} = \frac{5}{18}$$

Time taken by both hole together to empty the tank =

$$= \frac{18}{5} = 3\frac{3}{5} \text{ minutes}$$

4. A container has two holes. The first hole can empty the container individually in 15 minutes and the second hole can empty the container individually in 10 minutes. If the leakage occurs at a fixed rate in the container, then by the both holes opening together, the container will be emptied in how many minutes ?

- (a) 6 (b) $\frac{1}{6}$
(c) $\frac{1}{7}$ (d) 7

RRB NTPC 17.01.2017 Shift-3

Ans : (a) Part of the container emptied by hole-1 in 1 minute = $\frac{1}{15}$ part

Part of the container emptied by hole-2 in 1 minute = $\frac{1}{10}$ part

Part of the container emptied by both holes in 1 minute

$$= \frac{1}{15} + \frac{1}{10} = \frac{2+3}{30} = \frac{5}{30} = \frac{1}{6}$$

Hence the time taken by hole-1 and hole 2 to empty the container = $\frac{6}{1} = 6$ minutes

5. There are two holes in a tank. First hole empties the tank in 3 minutes. The second hole empties the tank in 5 minutes. If the leakage occurs at a fixed rate, then how much time will be taken by the both holes to empty the tank?

- (a) $\frac{7}{8}$ (b) $2\frac{7}{8}$
(c) $1\frac{5}{8}$ (d) $1\frac{7}{8}$

RRB NTPC 26.04.2016 Shift : 2

Ans : (d) Part to the tank emptied in 1 minute by the first hole = $\frac{1}{3}$ part

Part of the tank emptied in 1 minute by the second hole = $\frac{1}{5}$ part

∴ Part of the tank emptied by both holes in 1 minute

$$= \frac{1}{3} + \frac{1}{5} = \frac{5+3}{15} = \frac{8}{15} \text{ part}$$

Hence the entire tank will be empty in $\frac{15}{8} = 1\frac{7}{8}$ minute

6. A bowl has two holes. First hole alone can empty the bowl in 4 minutes. The second hole alone can empty the bowl in 12 minutes. If the leakage occurs at a fixed rate, then both holes will empty the bowl in how much time?

- (a) 1.33 (b) 3.5
(c) 4 (d) 3

RRB NTPC 30.04.2016 Shift : 3

Ans : (d) Part of the bowl emptied in 1 minute by both holes together = $\frac{1}{4} + \frac{1}{12}$

$$= \frac{3+1}{12} = \frac{4}{12} = \frac{1}{3}$$

Hence required time = 3 minutes

7. Three pipes A, B, & C may fill a tank in 15 hrs, 12 hrs and 18 hrs respectively. If both pipes A and C are opened at same time, then how much time they will take to fill the tank.

- (a) $6\frac{5}{9}$ (b) $9\frac{3}{5}$
(c) $7\frac{2}{3}$ (d) $8\frac{2}{11}$

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : According to the question,

$$\begin{array}{r} A - 15 \xrightarrow{12} \\ B - 12 \xrightarrow{15} \\ C - 18 \xrightarrow{10} \end{array} \rightarrow 180 \text{ unit}$$

On opening pipe A and pipe C simultaneously,

$$\text{Time taken to fill the tank} = \frac{180}{12+10}$$

$$= \frac{180}{22} = \frac{90}{11} = 8\frac{2}{11} \text{ hours}$$

8. Two pipes A and B can fill a tank in 12 min & 16 min respectively. Both pipes are opened together, but pipe A is closed 4 minutes before the tank is filled. In how many minutes the tank is completely filled?

- (a) 9 minutes 8 sec (b) 10 minutes 9 sec
(c) 11 minutes 9 sec (d) 11 minutes 29 sec

RRB NTPC 29.04.2016 Shift : 2

Ans : (a) Let it take T minute to fill the tank.

According to the question,

$$\frac{T-4}{12} + \frac{T}{16} = 1$$

$$\Rightarrow \frac{4(T-4) + 3T}{48} = 1$$

$$\Rightarrow 4T - 16 + 3T = 48$$

$$\Rightarrow 7T - 16 = 48$$

$$\Rightarrow 7T = 48 + 16$$

$$\Rightarrow 7T = 64$$

$$\Rightarrow T = \frac{64}{7} = 9\frac{1}{7} \text{ minute} = 9 \text{ min. } \frac{1}{7} \times 60 \text{ sec.}$$

$$= 9 \text{ min } 8.5 \text{ sec} \approx 9 \text{ min } 8 \text{ sec.}$$

9. A water container was $\frac{3}{5}$ full, when 38 litres of water is taken out of it, then $\frac{1}{8}$ part remains what is the total capacity of the container?

- (a) 60 litres (b) 65 litres
(c) 75 litres (d) 80 litres

RRB NTPC 03.04.2016 Shift : 3

Ans : (d) Let the total capacity of the container be x l.

According to the question,

$$\frac{3}{5}x - 38 = \frac{1}{8}x$$

$$\frac{3}{5}x - \frac{x}{8} = 38$$

$$\frac{24x - 5x}{40} = 38$$

$$19x = 38 \times 40$$

$$x = 2 \times 40 \quad x = 80 \text{ l}$$

Hence total capacity of container is 80 l.

10. A tank can be filled by 5 pipes in 80 minutes. How long will it take to fill the tank by 8 pipes of same dimensions?

- (a) 30 minutes (b) 78 minutes
(c) 128 minutes (d) 50 minutes

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (d) : \therefore Time taken to fill the tank by 5 pipes = 80 minutes

$$\therefore \text{Time taken to fill the tank by 8 pipes} = \frac{80 \times 5}{8} = 50 \text{ minutes}$$

Type - 2

When One Pipe is Fills and The Other Pipe Empties

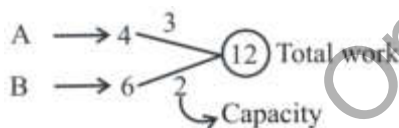
11. An inlet pipe can fill a tank in 4h and an outlet pipe can empty the tank in 6h. By mistake, both the pipe are kept open. Find the number of hours in which the tank will be half-full.

- (a) 12 h (b) 10 h
(c) 6 h (d) 8 h

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let inlet pipe = A

Outlet pipe = B



\therefore Time taken by both the pipes to fill the tank half-full. $= \frac{(12/2)}{3-2} = 6 \text{ hour}$

12. An oil tank takes 15 minutes to be filled. The oil tank is emptied by an outlet pipe which can empty it in 30 minutes. If this outlet pipe remains open, then how much time will it take to fill the tank completely?

- (a) 20 minute (b) 25 minute
(c) 30 minute (d) 40 minute

RRB NTPC 28.04.2016 Shift : 3

Ans : (c) If outlet pipe is open then filled part in 1 minute $= \frac{1}{15} - \frac{1}{30} = \frac{30-15}{15 \times 30}$

Time taken to fill the tank $= \frac{30 \times 15}{30-15} = \frac{30 \times 15}{15} = 30 \text{ minute}$

13. Tap A can fill a tank in 6 h, whereas Tap B can fill it in 8h. Tap C can empty the same tank in 4h. If all the taps are opened together, how much time will it take to fill the tank?

- (a) 26 h (b) 24 h
(c) 20 h (d) 22 h

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,

In 1 hour, Tap A will fill tank $= \frac{1}{6}$ part

In 1 hour, Tap B will fill tank $= \frac{1}{8}$ part

In 1 hour, Tap C will empty the same tank $= \frac{1}{4}$ part

All taps are opened together, the part of the tank filled in 1 hour.

$$= \frac{1}{6} + \frac{1}{8} - \frac{1}{4} = \frac{4+3-6}{24} = \frac{1}{24} \text{ part}$$

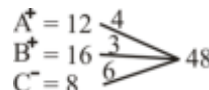
Hence, the tank will be filled completely in 24 hours when all the taps are opened together.

14. A tank has two inlet pipe A and B which can fill it in 12 hours and 16 hours respectively. An outlet pipe C can empty the filled tank in 8 hours. If all three pipes are opened together when the tank is empty, then how much time will it take to fill the tank?

- (a) 20 hours (b) 40 hours
(c) 36 hours (d) 48 hours

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,



Time taken to fill the tank

$$= \frac{48}{(4+3)-6} = \frac{48}{1} = 48 \text{ hours}$$

15. A tank has two inlets A and B, which can fill it in 15 hours and 20 hours respectively. An outlet C can empty the full tank in 12 hours. If A, B and C are opened together when the tank is empty, then in how much time will the tank be filled?

- (a) 30 hours (b) 35 hours
(c) 40 hours (d) 27 hours

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (a) : Part filled by A in one hour $= \frac{1}{15}$

Part filled by B in one hour $= \frac{1}{20}$

Part emptied by C in one hour $= \frac{1}{12}$

Part filled by (A + B + C) $= \frac{1}{15} + \frac{1}{20} - \frac{1}{12}$
 $= \frac{4+3-5}{60} = \frac{2}{60} = \frac{1}{30}$

Hence required time = 30 house

Type - 3 Miscellaneous

16. It takes 12.5 minutes for an utensil to get fully filled with juice. By this utensil the children drink juice at a fixed rate due to which the utensil is emptied in 25 minutes. At the present rate how much time will be taken to fill the utensil?

- (a) 20 minute (b) 12.5 minute
(c) 25 minute (d) 30 minute

RRB NTPC 18.01.2017 Shift : 3

Ans : (c) Part of the utensil filled in 1 minute.

$$= \frac{1}{12.5} - \frac{1}{25} = \frac{10}{125} - \frac{1}{25} = \frac{10-5}{125}$$

$$= \frac{5}{125} = \frac{1}{25}$$

Hence utensil will fill in 25 minutes.

17. A tank have 3 tap to fill water. The first tap take 6 h, the second tap takes 1 day and the third tap takes 18h to fill the tank. But there was a hole at the bottom, capable of emptying the completely filled tank in 18h. The hole was detected after 1h and was immediately fixed. How long will it take to fill the tank using all the three taps?

- (a) 3 h (b) $3\frac{15}{19}$ h
(c) 4 h (d) $4\frac{4}{5}$ h

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let all three taps together will fill the tank in x hours.

According to the question,

$$\frac{x}{6} + \frac{x}{24} + \frac{x}{18} - \frac{1}{18} = 1$$

$$\frac{12x + 3x + 4x}{72} = 1 + \frac{1}{18}$$

$$\frac{19x}{72} = \frac{19}{18}$$

$$x = 4 \text{ hours}$$

Hence required time is 4 hours.

18. Pipes A and B can fill an empty tank completely is 42 minutes and 56 minutes respectively. Pipe C alone can empty the full tank in 84 minutes. All the three pipes are opened together for 8 minutes and then C is closed. In how much time (in minutes) will A and B together fill the remaining part of the tank?

- (a) $17\frac{1}{7}$ (b) 16
(c) 18 (d) $18\frac{2}{7}$

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (d) : According to the question,

$$\begin{array}{lcl} A \rightarrow 42 & 4 & \\ B \rightarrow 56 & 3 & \\ C \rightarrow 84 & -2 & \end{array} \quad \begin{array}{l} \nearrow \\ \rightarrow \\ \searrow \end{array} \quad 84 \times 2 = 168 \text{ (Total work)}$$

Work done in 8 minutes $= 8 \times (4+3-2) = 40$ unit

Remaining work $= 168 - 40 = 128$

\therefore Required time $= \frac{128}{7} = 18\frac{2}{7}$ minute

19. A drum of water is $\frac{3}{4}$ full. When 9 litres of water is drawn from it, it is $\frac{1}{2}$ full. What is the capacity of the drum?

- (a) 20 litre (b) 36 litre
(c) 28 litre (d) 37 litre

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the capacity of drum = x litre

$$\frac{3x}{4} - 9 = \frac{x}{2}$$

$$\frac{3x - 2x}{4} = 9$$

$$x = 36 \text{ litre}$$

Simple Interest

Type - 1 Problems Based on Finding Simple Interest

1. The amount payable on maturity of a certain sum invested at a certain rate of simple interest per annum for one year was ₹ 1,484. If the rate of interest had been 2% higher, the amount would have been ₹ 26.50 more. What was the interest that was paid on the sum invested at the original rate?

- (a) ₹ 152.50 (b) ₹ 161
(c) ₹ 157 (d) ₹ 159

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (d) : Let Principal = ₹ P

According to the question,

2% of P = 26.50

$$P = \frac{26.50 \times 100}{2}$$

$$= ₹ 1325$$

Simple Interest = Amount - Principal
= 1484 - 1325 = ₹ 159

2. Find the simple interest on ₹ 48750 at 16% per annum for 73 days of a non-leap year.

- (a) ₹ 1560 (b) ₹ 1500
(c) ₹ 1600 (d) ₹ 1860

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (a) : Principal (P) = ₹ 48750

Rate (R) = 16% Annual

Time (t) = 73 days or $\frac{1}{5}$ years

$$S.I. = \frac{P \times R \times T}{100}$$

$$= \frac{48750 \times 16 \times \frac{1}{5}}{100 \times 5} = ₹ 1560$$

3. What is the simple interest (in ₹) on ₹540 at 6% per annum in $3\frac{1}{2}$ years?

- (a) 113.40 (b) 213.40
(c) 13.40 (d) 313.40

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (a) : Given that

P = 540

R = 6% p.a.

T = $3\frac{1}{2}$ years

$$SI = \frac{540 \times 6 \times 7}{200} = ₹ 113.40$$

4. What will be the interest on ₹6,250 for 3 years if interest accrues at 12% simple interest per annum?

- (a) ₹2,250 (b) ₹2,050
(c) ₹2,450 (d) ₹2,150

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (a) : According to the question

Given that

P = ₹ 6,250

R = 12%

T = 3 years

$$\text{Simple Interest} = \frac{P \times R \times T}{100}$$

$$= \frac{6250 \times 12 \times 3}{100} = ₹ 2250$$

5. What will be the simple interest on ₹ 10,000 at 12% per annum for 5 years?

- (a) ₹1,700 (b) ₹6,000
(c) ₹5,000 (d) ₹500

RRB NTPC 15.03.2021 (Shift-II) Stage I

Ans. (b) : Given,

P = 10000, R = 12%, T = 5

$$S.I. = \frac{P \times R \times T}{100}$$

$$SI = \frac{10000 \times 12 \times 5}{100}$$

$$S.I = 100 \times 60 = ₹ 6000$$

6. A bank provides a loan at the rate of 5% per annum to a trader on an amount of ₹12,50,000 for 5 years. The simple interest to be paid is:

- (a) ₹4,20,250 (b) ₹3,12,500
(c) ₹2,25,400 (d) ₹2,40,600

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given that

P = 12,50,000

R = 5% p.a.

T = 5 years

$$S.I. = \frac{P \times R \times T}{100}$$

$$SI = \frac{1250000 \times 5 \times 5}{100}$$

$$SI = ₹ 312500$$

7. The ratio of simple interest earned by a certain amount at the rate of 5% for 6 years and 8% for 3 years is:

- (a) 2 : 3 (b) 4 : 5
(c) 3 : 2 (d) 5 : 4

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (d) : Given that

$$\begin{aligned} R_1 &= 5\% \\ t_1 &= 6 \text{ years} \\ R_2 &= 8\% \\ t_2 &= 3 \text{ years} \end{aligned}$$

$$\text{Ratio of simple interest} = \frac{\frac{P \times 5 \times 6}{100}}{\frac{P \times 8 \times 3}{100}}$$

$$\begin{aligned} &= \frac{30}{24} \\ &= \frac{5}{4} \end{aligned}$$

$$SI_1 : SI_2 = 5 : 4$$

8. The simple interest on ₹10000 for 6 months at the rate of 5 paise per rupee per month is:

- (a) ₹1000 (b) ₹1500
(c) ₹3000 (d) ₹2000

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (c) : Rate of 5 paise/rupee per month = 5% per month

The SI on the same rate on ₹10000 for 6 month

$$\text{Simple Interest} = \frac{10,000 \times 5 \times 6}{100} = ₹3000$$

9. What will be the simple interest earned on an amount of ₹ 16,800 in 9 months at the rate of

$6\frac{1}{4}\%$ per annum?

- (a) 787.50 (b) 812.50
(c) 158 (d) 860

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (a) :

(Given, $R = 6\frac{1}{4}\%$ yearly, $T = 9$ months, $P = ₹ 16,800$)

$$S.I. = \frac{P \times R \times T}{100}$$

$$S.I. = \frac{16800}{100} \times \frac{25}{4} \times \frac{9}{12}$$

$$S.I. = ₹ 787.50$$

10. What will be the amount of simple interest on ₹75,000 at the rate of $2\frac{5}{3}\%$ per annum for a period of 5 years?

- (a) ₹13005 (b) ₹13000
(c) ₹13750 (d) ₹13050

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given

Principal amount = ₹ 75000

$$r = 2\frac{5}{3}\% = \frac{11}{3}\%$$

$$t = 5 \text{ years}$$

$$SI = \frac{P \times R \times T}{100}$$

$$SI = \frac{75000 \times 11 \times 5}{100 \times 3}$$

$$SI = 250 \times 55$$

$$SI = ₹ 13750$$

11. Mr. Ram invests an amount of ₹12,200 at the rate of 2% per annum for 4 years to obtain a simple interest. later he invests the principal amount as well as the amount obtained as simple interest for another 4 years at the same rate of interest. What amount of simple interest will be get at the end of the last 4 years?

- (a) ₹ 1,054.08 (b) ₹ 1,054.00
(c) ₹ 1,056.07 (d) ₹ 1,055.08

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Shree Ram will get the amount after the first 4 years.

$$= 12,200 + \frac{12200 \times 2 \times 4}{100}$$

$$= 12200 + 976 = ₹13176$$

And Shree Ram will get amount in next 4 years

$$= \frac{13176 \times 2 \times 4}{100}$$

$$= ₹1054.08$$

12. What will be the simple interest on a sum of ₹2,000 for 4 years at a rate of 1 paise per rupee per month?

- (a) ₹690 (b) ₹609
(c) ₹960 (d) ₹900

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

$$\text{Ans. (c) : } SI = \frac{P \times R \times T}{100}$$

$$= \frac{2000 \times 4 \times 12 \times 1}{100}$$

$$= ₹ 960$$

13. Find the total simple interest on ₹ 500 at 7% per annum, on ₹ 700 and 10% per annum and on ₹1000 at 4% per annum for 3 years.

- (a) 435 (b) 500
(c) 700 (d) 1000

RRB NTPC 12.04.2016 Shift : 3

$$\text{Ans : (a) } S.I. = \frac{PRT}{100}$$

$$S.I._{(1)} = \frac{500 \times 7 \times 3}{100} = ₹105$$

$$S.I._{(2)} = \frac{700 \times 10 \times 3}{100} = ₹210$$

$$S.I._{(3)} = \frac{1000 \times 4 \times 3}{100} = ₹120$$

$$\therefore S.I. = S.I._{(1)} + S.I._{(2)} + S.I._{(3)} \\ = 105 + 210 + 120 = ₹435$$

14. Rita invested a sum of money at the rate of 2.5% rate for 4 years. Sita invested the same amount at the same rate for 6 years. What is the ratio of the simple interest earned by Sita to that earned by Rita?

- (a) 3 : 2 (b) 2 : 3
(c) 1 : 3 (d) 1 : 4

RRB NTPC 28.04.2016 Shift : 2

Ans : (a) Suppose the sum of money is ₹x

$$\therefore \text{Simple interest for Rita} = \frac{x \times 2.5 \times 4}{100} = ₹ \frac{x}{10}$$

$$\text{Simple interest for Sita} = \frac{x \times 2.5 \times 6}{100} = ₹ \frac{3x}{20}$$

$$\therefore \text{Required ratio} = \frac{3x}{20} : \frac{x}{10} = 3 : 2$$

Type - 2

Problems Based on Finding The Principal

15. A certain sum amounts to ₹16500 in 2 years at 5% p.a. simple interest. Find the sum.

- (a) ₹ 14000 (b) ₹14500
(c) ₹ 15000 (d) ₹15500

RRB NTPC (Stage-II) -14/06/2022 (Shift-II)

Ans. (c) : Given that,

Total amount = ₹16500

Rate = 5% annual

Time = 2 years

Principal = ?

Let the Principal be ₹ P

$$\text{Then, } P + \frac{P \times R \times T}{100} = 16500$$

$$P + \frac{P \times 5 \times 2}{100} = 16500$$

$$\frac{11P}{10} = 16500$$

$$P = ₹ 15000$$

16. A sum of money, when invested at 14.5% p.a. simple interest amounts to ₹13,464 after 6 years. What was the sum invested?

- (a) ₹7,200 (b) ₹7,600
(c) ₹7,450 (d) ₹70,800

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (a) : Given,

Amount (A) = ₹13464

Rate (R) = 14.5% p.a.

Time (T) = 6 years

Let the invested sum = ₹ p

Now,

$$A = P \left(1 + \frac{RT}{100} \right)$$

$$13464 = P \left(1 + \frac{14.5 \times 6}{100} \right)$$

$$13464 = P \left(1 + \frac{87}{100} \right)$$

$$13464 = P \left(\frac{187}{100} \right)$$

$$P = \frac{13464 \times 100}{187}$$

$$= ₹7200$$

17. A sum of money invested at a certain rate of simple interest per annum amounts to ₹ 24500 in eight years and to ₹ 32000 in thirteen years. Find the sum invested.

- (a) ₹ 12500 (b) ₹ 13000
(c) ₹ 12000 (d) ₹ 11500

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (a) : Given,

Amount after 13 years = ₹32000

Amount after 8 years = ₹24500

Interest of 5 years = ₹7500

$$\text{Interest of 1 year} = \frac{7500}{5} = ₹1500$$

Interest of 8 years = 1500 × 8 = ₹12000

Principal = Amount – Interest

$$= 24500 - 12000$$

$$= ₹ 12500$$

18. Out of a sum of ₹9200 some amount was lent at the rate of 5% p.a. and the rest at 8% p.a. both earning simple interest. Total interest received after 3 years was ₹ 1812. The sum (in ₹) lent at 5% p.a. was :

- (a) ₹ 4,600 (b) ₹ 4,200
(c) ₹ 4,400 (d) ₹ 5,200

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (c) : Let amount lent at 5% rate is ₹x.

According to the question,

$$\frac{x \times 5 \times 3}{100} + \frac{(9200 - x) \times 8 \times 3}{100} = 1812$$

$$\Rightarrow 15x + 9200 \times 24 - 24x = 181200$$

$$\Rightarrow 9x = 220800 - 181200$$

$$\Rightarrow 9x = 39600$$

$$\Rightarrow x = ₹ 4400$$

19. A certain sum amounts to ₹ 22494 in 7 years at x% per annum on simple interest. If the rate of simple interest per annum had been (x + 4)% the amount payable after 7 years would have been ₹ 25917 . Find the sum invested.

- (a) ₹ 12,275 (b) ₹ 12,225
(c) ₹ 12,175 (d) ₹ 11,975

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : Let the invested sum = ₹ P
According to the question,

$$(22494 - P) = \frac{P \times x \times 7}{100} \text{ — (i)}$$

$$(25917 - P) = \frac{P(x + 4) \times 7}{100} \text{ — (ii)}$$

Subtracting eq. (i) from eq. (ii)

$$3423 = \frac{P \times 7}{100} \times 4$$

$$489 = \frac{P}{25}$$

$$P = 489 \times 25 = ₹ 12,225$$

Hence, Invested sum = ₹ 12,225

20. A sum of money was invested at simple interest at $r\%$ per annum for 3 years. Had the rate of interest been $(r + 2)\%$, it would have fetched ₹84 more. Find the sum invested.

- (a) ₹ 1,200 (b) ₹ 1,600
(c) ₹ 1,400 (d) ₹ 1,500

RRB NTPC (Stage-II) –13/06/2022 (Shift-II)

Ans. (c) : Given,

Rate = $r\%$ Time (t) = 3 years

If rate is $(r+2)\%$ then interest fetched ₹84 more

$$\text{Simple Interest} = \frac{P \times R \times T}{100}$$

According to the question,

$$\frac{P \times (r + 2) \times 3}{100} - \frac{P \times r \times 3}{100} = 84$$

$$\frac{3P}{100} (r + 2 - r) = 84$$

$$6P = 8400$$

$$P = 1400$$

Hence, Sum invested = ₹ 1400

21. Ravi took a loan from a bank at the rate of 8% p.a. simple interest. After 5 years, he had to pay an interest of ₹6,400 for the period. Find the Principal amount borrowed by Ravi.

- (a) ₹ 10,000 (b) ₹ 16,000
(c) ₹ 15,000 (d) ₹ 18,000

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given

Rate of interest (r) = 8%

Time (t) = 5 years

Simple interest (SI) = ₹6400

Principal (P) = ?

$$SI = \frac{P \times r \times t}{100}$$

$$6400 = \frac{P \times 8 \times 5}{100}$$

$$P = ₹16000$$

22. A sum becomes ₹26,400 after 2 years at simple interest of 5% per annum. Find the sum.

- (a) ₹29,040 (b) ₹2,640
(c) ₹2,400 (d) ₹24,000

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given

Rate = 5%, Time = 2 years, Amount = ₹26,400

$$\text{Amount} = \text{Principal} \left(1 + \frac{\text{Time} \times \text{Rate}}{100} \right)$$

$$A = P \left(1 + \frac{rt}{100} \right)$$

$$26400 = P \left(1 + \frac{5 \times 2}{100} \right)$$

$$26400 = P \left(1 + \frac{10}{100} \right)$$

$$P = \frac{26400 \times 10}{11}$$

Principal (P) = ₹ 24000

23. Manvi borrowed some money on simple interest, at the rate of 6% p.a. for the first three years, at the rate of 9% p.a. for the next five years and at the rate of 13% p.a. for the period beyond eight years. If the total interest paid by him at the end of eleven years is ₹8,160, how much money did he borrow?

- (a) ₹11,000 (b) ₹10,000
(c) ₹8,000 (d) ₹12,000

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let borrowed amount by Manvi = ₹ P

According to the question,

$$\frac{P \times 6 \times 3}{100} + \frac{P \times 9 \times 5}{100} + \frac{P \times 13 \times 3}{100} = 8160$$

$$18P + 45P + 39P = 816000$$

$$102P = 816000$$

$$P = ₹8000$$

24. A man invests money in three different schemes for 6 years, 10 years and 12 years, at 10%, 12% and 15% simple interest, respectively. If the completion of each scheme, he gets the same interest then the ratio of the respective investments is:

- (a) 7 : 4 : 3 (b) 6 : 3 : 2
(c) 5 : 4 : 3 (d) 4 : 3 : 2

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (b) : The required ratio of the respective investments

$$= \frac{1}{10 \times 6} : \frac{1}{10 \times 12} : \frac{1}{15 \times 12}$$

$$= 1 : \frac{1}{2} : \frac{1}{3}$$

$$= 6 : 3 : 2$$

25. If the annual rate of simple interest increases from 8% to $12\frac{1}{2}\%$, a person's yearly income

from interest increases by ₹369 then what is the principal amount of his investment ?

- (a) ₹8,150 (b) ₹8,200
(c) ₹8,100 (d) ₹8,500

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (b) \therefore The rate of interest increases from 8% to $12\frac{1}{2}\%$
 \therefore Increase = $(12\frac{1}{2} - 8)\%$
 $= 4.5\%$
 According to the question,
 $\therefore 4.5\% = ₹ 369$
 $\therefore 1\% = \frac{369}{4.5}$
 $\therefore 100\% = \frac{369}{4.5} \times 100$
 $= ₹ 8200$
 Hence, principal will be ₹8200.

- 26. Certain amount becomes ₹230 in 3 years at 5% simple interest per annum. Then the principal amount (₹) is:**
 (a) 180 (b) 150
 (c) 200 (d) 320

RRB NTPC 13.03.2021 (Shift-I) Stage I

Ans. (c) : Amount = Principal $\left[1 + \frac{R \times T}{100}\right]$
 $230 = \text{Principal} \left[1 + \frac{5 \times 3}{100}\right]$
 $230 = \text{Principal} \times \frac{23}{20}$
 $\text{Principal} = \frac{230 \times 20}{23} = ₹200$

- 27. A man invested $\frac{1}{2}$ of his capital at 5% rate of interest per annum, $\frac{1}{3}$ of his capital at 8% per annum and the remaining at 10% rate of interest per annum. His total income from the three investments is ₹820.00 in a year. The total capital invested is**
 (a) ₹ 16000.00 (b) ₹ 6400.00
 (c) ₹ 12000.00 (d) ₹ 8000.00

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (c) : Let capital invest = ₹ X

$$\text{Interest} = \frac{x \times \frac{1}{2} \times 5 \times 1}{100} + \frac{x \times \frac{1}{3} \times 8 \times 1}{100} + \frac{x \times \frac{1}{6} \times 10 \times 1}{100}$$

$$820 = \frac{\frac{5x}{2} + \frac{8x}{3} + \frac{10x}{6}}{100}$$

$$820 = \frac{30x + 32x + 20x}{1200}$$

$$820 = \frac{82x}{1200}$$

$$x = ₹ 12000$$

- 28. A sum of money of ₹2600.00 was lent out in two parts in such a way that the simple interest on the first part at 10% per annum for 5 years is the same as the interest of the second part at 9% per annum for 6 years. The part lent out at 10% is -**
 (a) ₹1250.00 (b) ₹1350.00
 (c) ₹1450.00 (d) ₹1150.00

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) : Let, the amount lent at 10% = ₹x
 Amount lent at 9% = ₹(2600-x)
 According to the question-

$$\frac{x \times 10 \times 5}{100} = \frac{(2600 - x) \times 6 \times 9}{100}$$

$$50x = 2600 \times 54 - 54x$$

$$104x = 140400$$

$$x = 1350$$

- 29. Balaji invested $\frac{1}{7}$ of his total investment at 4%, $\frac{1}{2}$ at 5% and the rest at 6% for 1 year. He received a total interest of ₹730. What was the total sum invested?**
 (a) ₹7,000 (b) ₹24,000
 (c) ₹14,000 (d) ₹38,000

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the money is ₹x.
 According to the question,

$$730 = \frac{x/7 \times 4 \times 1}{100} + \frac{5x/14 \times 6 \times 1}{100} + \frac{x/2 \times 5 \times 1}{100}$$

$$730 = \frac{8x + 30x + 35x}{1400}$$

$$730 \times 1400 = 73x$$

$$x = ₹14,000$$

- 30. A person invested $\frac{2}{3}$ of his capital at the rate of 6%, $\frac{1}{5}$ at the rate of 10% and the remaining at the rate of 15%. If his annual income is ₹600, the capital will be.**
 (a) ₹2500 (b) ₹4500
 (c) ₹5000 (d) ₹7500

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the capital of person be = ₹x
 As per question,

$$x \times \frac{2}{3} \times \frac{6}{100} + x \times \frac{1}{5} \times \frac{10}{100} + x \left[1 - \left(\frac{2}{3} + \frac{1}{5}\right)\right] \times \frac{15}{100} = 600$$

$$\frac{x}{25} + \frac{x}{50} + x \left[\frac{15 - (10 + 3)}{15}\right] \times \frac{15}{100} = 600$$

$$\frac{x}{25} + \frac{x}{50} + \frac{2x}{15} \times \frac{15}{100} = 600$$

$$\frac{x}{25} + \frac{x}{50} + \frac{2x}{100} = 600$$

$$\frac{4x + 2x + 2x}{100} = 600$$

$$\frac{8x}{100} = 600$$

$$x = ₹7500$$
 Total capital of person = ₹7500

31. The simple interest on a certain sum for 5 years at 13% per annum is ₹ 650. The sum is:
- (a) ₹1,090 (b) ₹1,096
(c) ₹1,065 (d) ₹1,000

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : Given,

$$\text{Rate} = 13\%$$

$$\text{Time} = 5 \text{ years}$$

$$\text{Interest} = ₹650$$

$$SI = \frac{P \times R \times T}{100}$$

$$650 = \frac{P \times 13 \times 5}{100}$$

$$P = ₹1000$$

32. Kumar lent an amount to Arif at a simple interest rate of 10% p.a. for 3 years, and Arif lent this amount to Naresh at a simple interest rate of 20% p.a. for 3 years. If the interest Arif received was ₹1,560 after 3 years, then what was the amount that Kumar had lent to Arif?
- (a) ₹5,400 (b) ₹5,600
(c) ₹6,200 (d) ₹5,200

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (d) : Let the amount = ₹P

According to the question,

$$\frac{P \times 20 \times 3}{100} - \frac{P \times 10 \times 3}{100} = 1560$$

$$60P - 30P = 1560 \times 100$$

$$30P = 156000$$

$$P = \frac{156000}{30}$$

$$P = ₹5200$$

33. The capital required to earn a monthly interest of ₹1500 at 12% per annum simple interest is:
- (a) ₹1 lakh (b) ₹1.5 lakh
(c) ₹25 lakh (d) ₹15 lakh

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (b) : Given,

$$SI = ₹1500$$

$$R = 12\%$$

$$T = \frac{1}{12} \text{ years}$$

Then, $SI = \frac{P \times R \times T}{100}$

$$1500 = \frac{P \times 12 \times 1}{100 \times 12}$$

$$P = \frac{1500 \times 100 \times 12}{12 \times 1}$$

$$P = ₹1,50,000$$

$$P = 1.5 \text{ lakh}$$

34. If simple interest is paid per annum on an amount invested for five years and the amount payable on maturity after the expiry of five years is ₹2340. However, if the amount had been invested for only two years, the amount payable on maturity would have been Rs. 2016 what was the original amount invested?

- (a) ₹2000/- (b) ₹1800/-
(c) ₹1600/- (d) ₹1750/-

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the Principal = ₹P

$$2340 - p = \frac{p \times r \times 5}{100} \quad \dots\dots\dots (i)$$

$$2016 - p = \frac{p \times r \times 2}{100} \quad \dots\dots\dots (ii)$$

Equation (i) ÷ (ii)

$$\frac{2340 - p}{2016 - p} = \frac{\frac{p \times r \times 5}{100}}{\frac{p \times r \times 2}{100}}$$

$$\frac{2340 - p}{2016 - p} = \frac{5}{2}$$

$$4680 - 2p = 10080 - 5p$$

$$3p = 5400$$

$$p = ₹1800$$

35. A sum of money invested for 4 years at 5% simple interest becomes ₹150/- on maturity. Find the amount invested?

- (a) ₹180/- (b) ₹125/-
(c) ₹120/- (d) ₹175/-

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the principal = ₹ P

According to the question,

$$SI = 150 - P$$

$$\therefore 150 - P = \frac{P \times 5 \times 4}{100}$$

$$750 - 5P = P$$

$$6P = 750$$

$$P = ₹125$$

36. Rahim invested a certain sum at 5% simple interest for 3 years. His friend Hiralal invested the same sum for 2 years at 7% simple interest. Rahim got ₹30 more interest than Hiralal. What was the amount invested by them?

- (a) ₹7,000.00 (b) ₹3,000.00
(c) ₹2,000.00 (d) ₹5,000.00

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$SI \text{ for Rahim} - SI \text{ for Hiralal} = ₹30$$

$$\frac{P \times 3 \times 5}{100} - \frac{P \times 2 \times 7}{100} = 30$$

$$\frac{P}{100} = ₹30$$

$$\text{Principal (P)} = ₹3000$$

37. A invests two equal amounts in two banks giving rates of simple interest at 10% per annum and 12% per annum respectively. At the end of the year, the interest earned in ₹1,650. The amount invested in each bank is:

- (a) ₹ 1,650 (b) ₹ 7,500
(c) ₹ 750 (d) ₹ 15,000

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let the amount invested = ₹x

Principal (P_1) = Principal (P_2)

Interest rate (R_1) = 10%

(R_2) = 12%

Time (T) = 1 year

Interest = ₹1650

$$\text{Simple interest} = \frac{P_1 R_1 T_1}{100} + \frac{P_2 R_2 T_2}{100}$$

$$1650 = \frac{x \times 10 \times 1}{100} + \frac{x \times 12 \times 1}{100}$$

$$1650 = \frac{22x}{100}$$

$$x = \frac{1650 \times 100}{22}$$

$$x = ₹7500$$

38. A sum of money lent at simple interest amounts to ₹720 after 2 years and to ₹1,020 after a further period of 5 years. What is the sum of money?

- (a) ₹400 (b) ₹500
(c) ₹200 (d) ₹600

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (d) : SI for 2 year (A) = ₹720

SI for 7 years (A) = ₹1020

∴ Simple Interest for 5 years

$$= 1020 - 720 = ₹300$$

$$\text{Per year simple interest} = \frac{300}{5} = ₹60$$

SI after 2 years = ₹720

Simple interest for 2 years = ₹120

Hence principal amount = 720 - 120 = ₹600

39. The simple interest on a given sum of money for two years would have been ₹240 more had the rate of interest per annum been 3% higher. Find the initial sum invested.

- (a) ₹3,000 (b) ₹3,600
(c) ₹8,000 (d) ₹4,000

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let the principal is ₹x

Rate = R %

Time = 1 year

According to the question,

$$\frac{x \times (R + 3) \times 1}{100} - \frac{x \times R \times 1}{100} = 240$$

$$\frac{3x}{100} = 240$$

$$x = ₹8000$$

40. The simple interest at the rate of y% of a principal for y years is ₹y. Find the principal.

- (a) $100 \div y$ (b) $100 \times y$
(c) $100y^2$ (d) $100 \div y^2$

RRB NTPC 16.04.2016 Shift : 1

Ans : (a) Let Principal = ₹P

From question,

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$y = \frac{P \times y \times y}{100}$$

$$P = \frac{100 \times y}{y \times y}$$

$$P = ₹ \frac{100}{y}$$

Type - 3

Problems Based on Finding The Amount

41. A sum of ₹3680 is invested at 12.5% p.a. simple interest for 6 years. What will be the total amount payable on maturity?

- (a) ₹6,420 (b) ₹6,440
(c) ₹6,480 (d) ₹6,460

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) : From question-

$$\text{Amount (A)} = P + \frac{PRT}{100}$$

$$= P \left(1 + \frac{RT}{100} \right)$$

$$= 3680 \left(1 + \frac{12.5 \times 6}{100} \right)$$

$$= 3680 \times \frac{175}{100} = ₹6440$$

42. A sum of ₹1000 amounts to ₹1140 in 2 years at simple interest. If the interest rate is increased by 4%, the original sum would amount to:

- (a) ₹1,160 (b) ₹1,180
(c) ₹1,220 (d) ₹1,200

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (c) : Given

Principal amount = ₹1000

Time = 2 years

Interest = 1140 – 1000 = 140

Rate = ?

$$\text{Simple Interest} = \frac{P \times T \times R}{100}$$

$$140 = \frac{1000 \times 2 \times R}{100}$$

Rate = 7%

After the increase of 4% in rate-

$$\text{Simple Interest} = \frac{1000 \times 2 \times 11}{100} = 220$$

Hence required amount = 1000 + 220 = ₹1220

43. Bhawna borrowed ₹ 4,500 from a lender at the rate of 15% per annum simple interest on 26 March 2018 and cleared the loan on 7 June of the same year. What amount did she pay to clear her loan?

- (a) ₹4,635 (b) ₹53,775
(c) ₹135 (d) ₹49,275

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (a) : Given-

R = 15%

P = ₹4500

T = 26 March 2018 to 7 June 2018

= 5 + 30 + 31 + 7

= 73 days

$$\text{SI} = \frac{P \times R \times T}{100}$$
$$= \frac{4500 \times 15 \times 73}{100 \times 365}$$

SI = 45 × 3

SI = 135

A = P + SI

= 4500 + 135

= ₹4,635

Hence, It is clear that she pays ₹4,635 to clear her loan.

44. A man deposits ₹5000 in his bank account for 5 years to earn a simple interest of 12% per annum. What amount will he get after 5 years?

- (a) ₹ 7,500 (b) ₹ 8,000
(c) ₹ 3,500 (d) ₹ 2,500

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b) : Principal (P) = ₹ 5000

Rate (R) = 12 %

Time (T) = 5 years

Amount = Principal + Simple interest

$$A = P + \frac{PRT}{100}$$
$$= 5000 + \frac{5000 \times 12 \times 5}{100}$$
$$= 5000 + 3000$$
$$= ₹ 8000$$

45. If ₹5000 becomes ₹5900 in one year, what will ₹8000 become at the end of 5 years at the same rate of simple interest?

- (a) ₹15,200 (b) ₹15,000
(c) ₹16,000 (d) ₹16,200

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : Simple interest received in one year,
= 5900 – 5000
= ₹ 900

According to the first condition –

$$\text{SI} = \frac{P \times R \times T}{100}$$
$$900 = \frac{5000 \times R \times 1}{100} \Rightarrow R = 18\%$$

According to the second condition –

$$\text{SI} = \frac{8000 \times 5 \times 18}{100} = ₹ 7200$$

Amount = 8000 + 7200 = ₹ 15200

46. Dalip Rai borrowed ₹ 24000 from Amarjeet at simple interest of 9% per annum. Find the sum he will have to return after 3 years.

- (a) ₹ 4,800 (b) ₹ 6,480
(c) ₹ 30,480 (d) ₹ 28,800

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$\text{SI} = \frac{24000 \times 9 \times 3}{100} = ₹ 6480$$

Amount = 24000 + 6480

= ₹ 30480

47. A sum of ₹800 becomes ₹920 in 3 years at simple interest. If interest is increased by 4%, then the amount will increase to:

- (a) ₹1,050 (b) ₹999
(c) ₹1,016 (d) ₹216

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (c) : Simple interest for 3 yrs = $920 - 800 = ₹ 120$
Simple interest for 1 yrs = ₹ 40

$$\text{Rate of S.I.} = \frac{40}{800} \times 100 = 5\% \quad \left(\because R = \frac{\text{SI} \times 100}{P \times T} \right)$$

New interest rate = $5 + 4 = 9\%$

Rate of interest for three yrs = $9 \times 3 = 27\%$

$$\text{Hence, increased amount} = 800 + 800 \times \frac{27}{100} = ₹ 1016$$

48. The amount of a sum of ₹ 1500 becomes ₹ 1800 in 2 years at simple interest. If the rate of interest is increased by 5%, what will be the amount.

- (a) ₹1500 (b) ₹1900
(c) ₹ 1950 (d) ₹2000

RRB NTPC 22.04.2016 Shift : 1

Ans : (c) Given -

Principal = ₹1500

Time = 2 Years

Amount = ₹1800

$$\therefore \text{Interest} = \text{Amount} - \text{Principal} \\ = 1800 - 1500 = ₹300$$

Formula-

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$\Rightarrow 300 = \frac{1500 \times R \times 2}{100}$$

$$\Rightarrow R = 10\%$$

New rate after increasing interest rate by 5% = $10\% + 5\% = 15\%$

$$\text{New simple interest} = \frac{1500 \times 15 \times 2}{100} = ₹450$$

$$\text{New amount} = \text{Principal} + \text{Interest} \\ = 1500 + 450 \\ = ₹1950$$

Type - 4

Problems Based on Finding The Rate

49. The amount payable on maturity of a certain sum which is invested for 5 years at a certain rate percent p. a is ₹ 9,800 and the amount payable on the same sum invested for 10 years at the same rate is ₹ 12,600 . If simple interest is offered in both cases, the rate of interest p.a . is.

- (a) 7.8% (b) 10%
(c) 8.5% (d) 8%

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (d) : \because Principal amount are equal in both and also same rate for each.

$$\text{Simple interest of 5 years} = 12600 - 9800 = ₹ 2800$$

$$\therefore \text{Simple interest of 1 year} = 2800/5 = ₹ 560$$

$$\text{Principal amount (P)} = (9800 - 2800) = ₹ 7000$$

$$\text{Then, annual interest rate} = \frac{560}{7000} \times 100 = 8\%$$

50. At a certain rate of simple interest per annum a sum of money amount to $\frac{13}{8}$ of itself in 10 years.

What is the rate of simple interest per annum?

- (a) 5% (b) 7.5%
(c) 7.25% (d) 6.25%

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (d) : Given,

Time (T) = 10 years

Rate (R) = ?

Then,

According to the question,

$$(N-1) \times 100 = R \times T$$

$$\left(\frac{13}{8} - 1 \right) \times 100 = R \times 10$$

$$\frac{5}{8} \times 100 = R \times 10$$

$$\frac{50}{8} = R$$

$$\text{Rate (R)} = 6.25\%$$

51. A certain sum doubles itself in 8 years on simple interest per annum. Find the rate percentage of the interest.

- (a) 11% (b) 12%
(c) 11.5% (d) 12.5%

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (d) : Given,

Time (T) = 8 Years

Rate (R) = ?

Then,

$$(N-1) \times 100 = R \times T$$

$$(2-1) \times 100 = R \times 8$$

$$R = \frac{100}{8}$$

$$\text{Rate (R)} = 12.5\%$$

52. At what rate of simple interest will a sum of money triple itself in 8 years?

- (a) 30% (b) 20%
(c) 25% (d) 35%

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let amount P become 3P in 8 years by 8% annual rate then-

$$\text{Simple Interest of 8 years} = 3P - P = 2P$$

$$\text{So, Simple Interest} = \frac{\text{Principal amount} \times \text{Rate} \times \text{Time}}{100}$$

$$2P = \frac{P \times r \times 8}{100}$$

$$r = \frac{2 \times 100}{8} = 25\%$$

$$\text{So, } r = 25\%$$

53. Anil Kumar took a loan of ₹24,000 with simple interest for as many years as the rate of interest. If he paid ₹19,440 as interest at the end of the loan period, what was the rate of interest?

(a) 8.5% (b) 10% (c) 8% (d) 9%

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (d) : Given

$$P = ₹ 24000$$

$$SI = ₹ 19440$$

$$t = r$$

$$r = ?$$

According to the question,

$$SI = \frac{P \times r \times t}{100}$$

$$19440 = \frac{24000 \times r \times r}{100}$$

$$r^2 = \frac{19440 \times 100}{24000}$$

$$r^2 = 81$$

$$r = 9$$

54. The rate at which a sum becomes 2 times of itself in 10 years at simple interest is :

(a) 25% (b) 15%
(c) 20% (d) 10%

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (d) :

Let principal = ₹ P

time (t) = 10 years

Rate = r %

Amount = Principal + SI

$$2P = P + \frac{Pr t}{100}$$

$$2P - P = \frac{P \times r \times 10}{100}$$

$$P = \frac{Pr}{10}$$

$$r = 10\%$$

55. A sum of money invested at X% simple interest per annum amounts to ₹ 2,368 in 6 years and to ₹ 3,008 in 11 years. Find the value of X.

(a) 5 (b) 8
(c) 7.5 (d) 6

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (b) : Amount in 6 years = ₹ 2368

Amount in 11 years = ₹ 3008

$$\text{Simple interest of 5 years} = 3008 - 2368 = ₹ 640$$

$$\text{Simple interest of 1 year} = \frac{640}{5} = 128$$

$$\text{Hence, principal amount} = 2368 - 128 \times 6 = ₹ 1600$$

According to the question-

$$\text{Simple interest} = \frac{P \times x \times t}{100}$$

$$128 = \frac{1600 \times x \times 1}{100}$$

$$x = 8\%$$

56. A woman borrowed some money on simple interest. After 4 years she returned $\frac{6}{5}$ of money to the lender. What was the rate of interest?

(a) 3% p.a. (b) 2% p.a.
(c) 5% p.a. (d) 4% p.a.

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (c) : Let the principal = P and R be the rate of interest

$$\text{Amount} = \frac{6P}{5}$$

$$\therefore SI = \frac{6P}{5} - P$$

$$= \frac{P}{5}$$

$$\therefore \frac{P}{5} = \frac{P \times R \times 4}{100}$$

$$R = 5\%$$

57. The difference between the simple interest from two different rates on ₹1,200 for 3 years is ₹10.80. The difference between their rates of interest is.

(a) 0.03% (b) 1%
(c) 0.6% (d) 0.3%

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) Let the two interest rates be r_1 & r_2 .

As per question,

$$\frac{1200 \times r_1 \times 3}{100} - \frac{1200 \times r_2 \times 3}{100} = 10.80$$

$$\frac{1200 \times 3}{100} (r_1 - r_2) = 10.80$$

$$r_1 - r_2 = \frac{10.80 \times 100}{1200 \times 3}$$

$$r_1 - r_2 = 0.3\%$$

Hence, difference between rate of interest ($r_1 - r_2$) = 0.3%

58. An amount doubles itself on simple interest in 4 years. What is the percent per annum rate of interest?

(a) 100% (b) 25%
(c) 50% (d) 12.5%

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (b) : Let amount = ₹P

And rate = r% yearly

$$\therefore \text{Simple interest} = 2P - P = ₹P$$

Time = 4 years

$$\therefore P = \frac{P \times r \times 4}{100}$$

$$r = 25\% \text{ per annum}$$

59. A sum of ₹25000/- amounts to ₹31500/- in 4 years at a certain rate of simple interest. What is the rate of Interest.

(a) 4.5% (b) 5.5%
(c) 6.5% (d) 3.5%

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (c) : Principal amount = ₹25000, Final amount = ₹31500

$$\text{Interest} = \text{Final amount} - \text{Principal amount} \\ = 31500 - 25000 = ₹6500$$

The annually interest increases equally in simple interest.

$$\text{Interest of 4 years} = 6500$$

$$1 \text{ year} = \frac{6500}{4} = ₹1625$$

$$\text{Rate of interest} = \frac{\text{Interest for one year}}{\text{Principal amount}} \times 100$$

$$\text{Rate of interest} = \frac{1625}{25000} \times 100 \\ = 6.5\%$$

60. Simple interest on ₹50,000 at certain rate for 5 years is ₹20,000. The rate of interest is;

- (a) 25% per annum (b) 5% per annum
(c) 4% per annum (d) 8% per annum

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (d) : Given,

$$\text{Principal} = ₹50,000 \quad \text{Interest} = ₹20,000 \\ \text{Time} = 5 \text{ years}$$

$$\therefore \text{SI} = \frac{P \times r \times t}{100} \\ \Rightarrow 20,000 = \frac{50000 \times r \times 5}{100}$$

$$\Rightarrow \text{Rate} = 8\% \text{ per annum}$$

61. A sum of money amounts to ₹12000 after 6 years and ₹15000 after 9 years at the same rate of Simple Interest. What is the rate of interest per annum?

- (a) $16\frac{2}{3}\%$ (b) $18\frac{2}{3}\%$
(c) $16\frac{1}{3}\%$ (d) 16%

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) : Simple Interest of (9-6) years = ₹ (15000-12000)

$$\text{Simple Interest of 3 years} = ₹ 3000$$

$$\text{Simple Interest of 6 years} = ₹ 6000$$

$$\text{Principal} = ₹ 12000 - ₹ 6000 = ₹ 6000$$

Let, Rate = $r\%$ yearly

$$\text{SI} = \frac{P \times r \times t}{100}$$

$$6000 = \frac{6000 \times r \times 6}{100}$$

$$\Rightarrow 100 = 6r$$

$$\Rightarrow r = \frac{100}{6} = 16\frac{2}{3}\%$$

62. Vikas took a loan of ₹1,200 on simple interest that is equal to as many years as the rate of interest. If he paid ₹768 as interest at the end of the loan period, then what was the rate of interest?

- (a) 8.5% (b) 73.8%
(c) 8.0% (d) 7.5%

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$\text{Principal} = ₹ 1200$$

$$\text{SI} = ₹ 768$$

$$\text{Time} = \text{Rate}$$

$$t = r$$

$$\text{SI} = \frac{P \times r \times t}{100}$$

$$768 = \frac{1200 \times r^2}{100}$$

$$\Rightarrow r^2 = \frac{768}{12} = 64$$

$$r = \sqrt{64}$$

$$r = 8\%$$

63. Anil lent ₹ 7200 to Dubey for 3 years and ₹8400 to Raghav for 4 years on simple interest at the same rate of interest and received ₹ 4968 in total from them as interest. Find the rate of interest per year.

- (a) 8% (b) 10%
(c) 12% (d) 9%

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let Rate of Interest is $R\%$ per annum
According to the question,

$$\frac{7200 \times 3 \times R}{100} + \frac{8400 \times 4 \times R}{100} = 4968$$

$$\Rightarrow 216R + 336R = 4968$$

$$\Rightarrow 552R = 4968$$

$$\Rightarrow R = 9\%$$

64. A sum becomes its double in 8 years. The annual rate of simple interest is

- (a) 10% (b) $12\frac{1}{2}\%$
(c) 8% (d) $9\frac{1}{2}\%$

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let amount P become $2P$ in 8 years at the rate of $r\%$ per annum, then

$$\text{Simple Interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

$$2P - P = \frac{P \times r \times 8}{100}$$

$$r = \frac{100}{8} = \frac{25}{2} = 12\frac{1}{2}\%$$

$$\text{Hence required rate of interest } (r) = 12\frac{1}{2}\%$$

65. At what percent rate per annum will the simple interest in 15 years on a sum of money be $\frac{3}{4}$ of the sum invested?

- (a) 3% (b) 6%
(c) 5% (d) 4%

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let principal be x
According to the question-
As per the question, T = 15 years
Let the amount invested = ₹ x

$$\therefore \text{S.I.} = \frac{P \times R \times T}{100}$$

$$\frac{3}{4}x = \frac{x \times R \times 15}{100}$$

$$R = 5\%$$

66. Lalit gave a loan of ₹ 12,000 to his friend Tarun at simple interest for 2 years and got ₹1200 as interest. Find the rate of interest per annum.

- (a) $5\frac{5}{9}\%$ Per annum (b) 10% Per annum
(c) 5% Per annum (d) 500% Per annum

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given

$$P = ₹12,000$$

$$T = 2 \text{ years}$$

$$SI = ₹1200$$

Let rate of interest be R% per annum

$$SI = \frac{P \times R \times T}{100}$$

$$1200 = \frac{12000 \times R \times 2}{100}$$

$$R = 5\% \text{ per annum}$$

67. The simple interest on an amount of ₹3400 for 4 years is ₹680. The rate of interest is:

- (a) 6% (b) 4%
(c) 8% (d) 5%

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (d) : Let Rate of Interest = r% per annum

According to the question,

$$680 = \frac{3400 \times r \times 4}{100}$$

$$r = \frac{68000}{3400 \times 4}$$

$$r = 5\% \text{ per annum}$$

68. Find the simple interest rate at which a sum of money at the rate of simple interest becomes five times in 10 years.

- (a) 40% (b) 35%
(c) 25% (d) 50%

RRB NTPC 18.04.2016 Shift : 2

Ans : (a) Time = 10 Years

Let Principal = ₹x & rate of interest be R% per annum

$$\therefore \text{Amount} = 5x$$

$$\text{Simple interest} = 5x - x = 4x$$

$$\text{Rate} = R\%$$

$$\text{Simple interest} = \frac{PTR}{100}$$

$$4x = \frac{x \times 10 \times R}{100}$$

$$R = 40\%$$

69. The maturity value after 3 years and 5 years at the same rate of simple interest as a fixed sum of money is ₹8255 and ₹9425 respectively. Find the annual rate of interest.

- (a) 9% (b) 8%
(c) 7% (d) 6%

RRB NTPC 31.03.2016 Shift : 1

Ans : (a) Given that the maturity amount of 3 years and Simple interest of 2 years = 9425 - 8255 = ₹1170

$$\text{Simple interest of 3 years} = \frac{1170}{2} \times 3 = 1755$$

$$\therefore \text{Principal} = 8255 - 1755 = ₹6500$$

$$\therefore \text{S.I.} = \frac{PRT}{100}$$

$$1755 = \frac{6500 \times R \times 3}{100}, R = \frac{1755}{65 \times 3} = 9\%$$

70. Simple interest at the rate of 12% is added to the principal at the end of every six months. Then what will be the annual effective rate of interest?

- (a) 12.34% (b) 12.26%
(c) 12.38% (d) 12.36%

RRB NTPC 30.03.2016 Shift : 2

Ans : (d) Let Principal = ₹100

According to the question-

$$\therefore \text{Interest of last six months} = \frac{100 \times 12 \times 6}{100 \times 12} = ₹6$$

$$\therefore \text{Principal for next six months} = 100 + 6 = ₹106$$

$$\text{Interest} = \frac{106 \times 12 \times 6}{100 \times 12} = ₹6.36$$

$$\therefore \text{Annual of effective rate of interest} = 6 + 6.36 = 12.36\%$$

71. Ram lent ₹6,000 to Shiva for 3 years and ₹8,000 to Krishna for 5 years at the same rate of simple interest per annum. He got total interest of ₹ 5,220 from both. Find the rate of interest per annum.

- (a) 6% (b) 7%
(c) 8% (d) 9%

RRB NTPC 29.03.2016 Shift : 3

Ans : (d) According to the question-

Let annual rate of interest = R%

$$\therefore \frac{6000 \times R \times 3}{100} + \frac{8000 \times R \times 5}{100} = ₹ 5220$$

$$180R + 400R = ₹5220$$

$$580R = ₹5220$$

$$R = \frac{5220}{580} = 9\%$$

72. The simple interest on a deposit of ₹8500 per annum for 3 years is ₹2040. Find the annual rate of interest.

- (a) 8% (b) 8.5%
(c) 9% (d) 7.5%

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) Given that

$$P = ₹8500$$

$$T = 3 \text{ years}$$

$$SI = ₹2040$$

According to the question-

$$SI = \frac{P \times R \times T}{100}$$

$$2040 = \frac{8500 \times R \times 3}{100}$$

$$2040 = 85 \times R \times 3$$

$$R = \frac{2040}{85 \times 3} = 8\%$$

73. The simple interest of ₹7800 for 2 years 8 months is ₹1976. Find the annual rate of interest.

(a) 8.5%

(b) 9%

(c) 9.5%

(d) 10%

RRB NTPC 12.04.2016 Shift : 2

Ans : (c) Given

$$\text{Principal} = ₹7800$$

$$\text{Time} - 2 \text{ Year } 8 \text{ months} = \left(2 + \frac{8}{12}\right) \text{ Years} = \frac{8}{3} \text{ Years}$$

$$\text{Rate} = ?$$

$$\text{Simple interest} = ₹1976$$

According to the question-

$$S.I. = \frac{P \times T \times R}{100}$$

$$1976 = \frac{7800 \times R \times 8}{300}$$

$$\frac{1976 \times 300}{7800 \times 8} = R$$

$$R = \frac{19}{2} = 9.5\%$$

74. The numerical value of the given rate of interest (in percentage) and time (in years) are equal and the simple interest on an amount is $\frac{9}{16}$ of the principal. Find the rate of simple interest.

(a) $9\frac{1}{2}\%$

(b) 11%

(c) $15\frac{1}{2}\%$

(d) 12%

RRB NTPC 22.04.2016 Shift : 3

Ans : (c) Given

$$\text{Simple interest} = \text{Principal} \times \frac{9}{16}$$

$$\frac{\text{Simple interest}}{\text{Principal}} = \frac{9}{16}$$

$$R = N$$

According to the question-

$$\therefore \text{Rate of Interest (R)} = \frac{100 \times 9}{16 \times R}$$

$$R^2 = \frac{900}{16}$$

$$R = \sqrt{\frac{900}{16}} = \frac{30}{4} = \frac{15}{2}\%$$

75. If the interest earned over a period of 8 years is equal to the principal, what is the rate of simple interest applied?

(a) 8

(b) 10.5

(c) 12

(d) 12.5

RRB NTPC 29.04.2016 Shift : 1

Ans : (d) Given

$$\text{Time (T)} = 8 \text{ Years}$$

$$\text{Rate (R)} = ?$$

According to the question-

$$\text{Principal (P)} = \text{Simple interest (SI)}$$

$$P = SI$$

$$\therefore SI = \frac{PTR}{100}$$

$$\therefore P = \frac{P \times 8 \times R}{100}$$

$$\Rightarrow R = \frac{P \times 100}{P \times 8}$$

$$\Rightarrow R = 12.5\%$$

Type - 5

Problems Based on Finding The Time

76. Suresh borrows ₹ 80,000 at 24% per annum simple at interest and Ramesh borrows ₹ 91,000 at 20% per annum at simple interest. In how many years will their amounts of debts be equal?

(a) 11

(b) 10

(c) 22

(d) 20

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (a) : Let time be T years

Given,

$$P_1 = ₹ 80,000$$

$$P_2 = ₹ 91,000$$

$$R_1 = 24\%$$

$$R_2 = 20\%$$

According to the question,

$$P_1 + \frac{P_1 \times R_1 \times T}{100} = P_2 + \frac{P_2 \times R_2 \times T}{100}$$

$$80000 + \frac{80000 \times 24 \times T}{100} = 91000 + \frac{91000 \times 20 \times T}{100}$$

$$19200 T - 18200 T = 91000 - 80000$$

$$1000 T = 11000$$

$$T = 11 \text{ years}$$

77. A sum of ₹14500 was invested at 9% per annum simple interest for few years. The interest accrued during this period was ₹7830. What was the period of investment?

(a) 7 years

(b) 5 years

(c) 4 years

(d) 6 years

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (d) : Given that

$$P = ₹14500$$

$$R = 9\% \text{ per annum}$$

According to the question-

$$\begin{aligned} \text{Time} &= \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Rate}\%} \\ &= \frac{7830 \times 100}{14500 \times 9} \\ &= \frac{870}{145} \\ &= 6 \text{ years} \end{aligned}$$

Hence the period of money invested = 6 years

78. Determine the number of months required to get ₹25.5 as simple interest on ₹850 at 3.6% per annum.

- (a) 11 months (b) 9 months
(c) 10 months (d) 8 months

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,

$$\text{Principal} = ₹850, \text{Rate} = 3.6\%$$

$$\text{Simple Interest} = ₹25.5$$

According to the question-

$$\begin{aligned} \therefore SI &= \frac{P \times R \times T}{100} \\ \Rightarrow 25.5 &= \frac{850 \times 3.6 \times T}{100} \\ \Rightarrow T &= \frac{25.5 \times 100}{850 \times 3.6} \\ &= \frac{5}{6} \text{ years} \\ &= \frac{5}{6} \times 12 \text{ Months} \\ &= 10 \text{ Months} \end{aligned}$$

79. A certain sum of money amounts to ₹ 2613 in 6 years at 5% simple interest per annum. In how many years will it amount to ₹ 3015 at the same rate?

- (a) 10 years (b) 15 years
(c) 18 years (d) 12 years

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the principal (P) = ₹ 100

$$\text{Given that amount} = ₹ 2613$$

$$\text{Time} = 6 \text{ years}$$

$$\text{Rate} = 5\% \text{ per annum}$$

$$\text{Amount} = \text{Principal} + \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

$$A = P \left[\frac{100 \times 6 \times 5}{100} \right]$$

$$2613 = P \left(1 + \frac{5 \times 6}{100} \right)$$

$$2613 = P \times \frac{130}{100}$$

$$P = \frac{2613 \times 100}{130}$$

$$P = ₹ 2010$$

Let time for simple interest = t years

$$\therefore \text{Simple interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

$$(3015 - 2010) \times 100 = 2010 \times 5 \times t$$

$$1005 \times 10 = 201 \times 5 \times t$$

$$t = \frac{1005 \times 10}{1005} = 10 \text{ years}$$

Hence required time is 10 years

80. A sum of money amount to 3 time the original sum in 15 years. In how many years will the original sum amount to 5 times of itself at the same rate of simple interest.

- (a) 35 (b) 30
(c) 25 (d) 20

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the Principal = ₹ P,
Given

$$T = 15 \text{ years, Amount} = 3P$$

$$SI = \text{Amount} - \text{Principal}$$

$$= 3P - P = 2P$$

According to the question-

$$SI = \frac{P \times R \times T}{100}$$

$$2P = \frac{P \times R \times 15}{100}$$

$$R = \frac{40}{3} \%$$

$$\text{Again, } SI = \frac{P \times R \times T}{100}$$

$$4P = P \times \frac{40}{3} \times \frac{T}{100}$$

$$T = 30 \text{ years}$$

81. How many years will it take for an amount of ₹400 to yield ₹450 as interest at 5% per annum on simple interest?

- (a) 23 (b) 21.5
(c) 22.5 (d) 22

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given

$$SI = ₹450, \text{Principal} = ₹400$$

$$\text{Rate} = 5\%, \text{time} = ?$$

$$\text{Time} = \frac{SI \times 100}{P \times R}$$

According to the question-

$$\text{Time} = \frac{450 \times 100}{400 \times 5} = \frac{90}{4} = \frac{45}{2}$$

$$\text{Time} = 22.5 \text{ years}$$

82. Amount of ₹5,000 has been invested via simple interest at the rate of 10%. Then in how many years interest would be ₹1,500.

- (a) 6 (b) 3
(c) 5 (d) 8

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (b) : Given

$$P = ₹5000$$

$$R = 10\% \text{ per annum}$$

$$SI = ₹1500$$

According to the question-

$$\text{From } SI = \frac{P \times R \times T}{100}$$

$$1500 = \frac{5000 \times 10 \times T}{100}$$

$$T = 3 \text{ years}$$

Hence required time is 3 years.

83. Abdul received ₹12,600 as simple interest on a sum of ₹70,000 at the rate of 12% per annum interest in certain period. Find the time?

- (a) 3 years (b) $\frac{3}{2}$ years
(c) $\frac{2}{3}$ years (d) 15 years

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (b) : Given,

$$P = ₹70,000, \quad R = 12\%$$

$$SI = ₹12,600, \quad T = ?$$

$$SI = \frac{PRT}{100}$$

$$T = \frac{SI \times 100}{P \times R}$$

According to the question-

$$= \frac{12600 \times 100}{70000 \times 12} = \frac{18}{12} = \frac{3}{2} \text{ years}$$

84. How long will it take a sum of money invested at 6% p.a. on simple interest to increase its value by 50%?

- (a) 3 years (b) 8 years
(c) $8\frac{1}{3}$ years (d) $3\frac{1}{8}$ years

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let Principal (P) = ₹100

Given,

$$\text{Time} = T \text{ year}$$

$$\text{Rate (r) \%} = 6\% \text{ Annually}$$

$$\text{On increasing } 50\%$$

$$SI = ₹50$$

$$\left[\because SI = \frac{P \times r \times T}{100} \right]$$

According to the question-

$$50 = \frac{100 \times 6 \times T}{100}$$

$$\frac{25}{3} = T$$

$$\text{or } T = 8\frac{1}{3} \text{ years}$$

Hence required time is $8\frac{1}{3}$ years

85. If the simple interest for 8 years is equal to 40% of the principal amount, it will be equal to the principal amount at the same rate of interest after.

- (a) 16 years (b) 20 years
(c) 18 years (d) 15 years

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let, Principal = ₹x

$$\text{and Interest rate} = R\%$$

According to the question,

$$\therefore SI = 40\% \text{ of } ₹x = \frac{40}{100}x$$

$$\frac{x \times R \times 8}{100} = \frac{40}{100} \times x$$

$$R = 5\%$$

Let, the principal amount will be equal to the simple interest in 't' years.

$$\text{Now, } \frac{x \times 5 \times t}{100} = x \Rightarrow t = 20 \text{ years}$$

So, the interest received in 20 years will be equal to the principal amount.

86. How long will it take a sum of money invested at 10% per annum at simple interest to increase its value by 40%?

- (a) 8 years (b) 9 years
(c) 6 years (d) 4 years

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (d) : Let the principal be ₹P

Given,

$$\text{Rate} = 10\% \text{ annually}$$

$$\text{Time} = t \text{ years}$$

According to the question,

$$\text{Amount} = P \times \frac{140}{100} = ₹\frac{7P}{5}$$

$$\frac{7P}{5} = P + \frac{P \times 10 \times t}{100}$$

$$\frac{7P}{5} = \frac{100P + 10Pt}{100}$$

$$140P = 100P + 10Pt$$

$$10Pt = 40P$$

$$t = \frac{40}{10} = 4 \text{ years}$$

Hence required time is 4 years.

87. If the simple interest for 7 years is equal to 56% of the principal amount, it will be equal to the principal after :

- (a) 12 years 6 months (b) 10 years 9 months
(c) 9 years 8 months (d) Seven years six months

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (a) : $S.I. = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

According to the question,

$$\frac{P \times 56}{100} = \frac{P \times 7 \times R}{100}$$

$$R = 8\%$$

Let the principal be equal to the simple interest after t_1 years.

$$S.I. = \frac{P \times 8 \times t_1}{100} = P$$

$$8t_1 = 100$$

$$t_1 = 12.5 \text{ years}$$

$$t_1 = 12 \text{ years } 6 \text{ months}$$

88. A sum of money becomes 3 times of itself in 5 years. In how many years will this sum become 5 times of itself at the same rate of interest?

- (a) 5 year (b) 10 year
(c) 9 year (d) 8 year

RRB NTPC 12.04.2016 Shift : 2

Ans : (b) Let (Principal) = P, Rate = R%

$$\text{Amount} = 3P$$

Given

$$\therefore \text{Interest} = 2P, \text{Time} = 5 \text{ Years}$$

$$S.I. = \frac{P \times T \times R}{100}$$

According to the question-

$$2P = \frac{P \times 5 \times R}{100} \Rightarrow R = \frac{200}{5}$$

$$R = 40\%$$

When $S.I. = 4P$

$$S.I. = \frac{PTR}{100}$$

$$\frac{P \times T \times 40}{100} = 4P$$

$$T = 10 \text{ Years}$$

89. In how much time simple interest will be ₹400 on ₹4000 (principal) at 6% per annum.

- (a) 20 months (b) 22 months
(c) 14 months (d) 18 months

RRB NTPC 18.01.2017 Shift : 2

Ans : (a) Given

$$SI = ₹ 400$$

$$P = ₹ 4000$$

$$\text{Let time} = 1 \text{ years}$$

According to the question-

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$400 = \frac{4000 \times 6 \times t}{100}$$

$$\text{Time} = \frac{40000}{4000 \times 6} = \frac{10}{6} \text{ years} = \frac{10}{6} \times 12 = 20 \text{ months}$$

90. In how much time will a sum of money become 7/6 of itself at the rate of 25% simple interest?

- (a) 6 months (b) 8 months
(c) 9 months (d) 10 months

RRB NTPC 18.04.2016 Shift : 3

Ans : (b) Let Principal is ₹x and amount is ₹ $\frac{7x}{6}$.

Then According to the question,

$$\frac{7x}{6} - x = \frac{x \times 25 \times \text{Time}}{100}$$

$$\Rightarrow \frac{x}{6} = \frac{x \times 25 \times \text{Time}}{100}$$

$$\Rightarrow \text{Time} = \frac{4}{6} \text{ Years} = \frac{4}{6} \times 12 \text{ months} = 8 \text{ months}$$

91. At what time will the simple interest of ₹8750 becomes 6/25 of the principal at an annual rate of 8%?

- (a) 3 years (b) 4 years
(c) 2 years (d) 5 years

RRB NTPC 28.03.2016 Shift : 2

Ans : (a) Given

$$SI = ₹ 8750$$

From Question-

$$\text{Simple Interest} = 8750 \times \frac{6}{25} = ₹ 2100$$

$$\frac{8750 \times n \times 8}{100} = 2100$$

$$n = \frac{210000}{8750 \times 8}$$

$$n = 3 \text{ years}$$

92. An interest on an amount borrowed at an annual rate of 6% in x years is 1/3 of its principal. Find x.

- (a) $5\frac{5}{9}$ (b) $4\frac{2}{29}$
(c) $6\frac{3}{7}$ (d) $5\frac{3}{4}$

RRB NTPC 03.04.2016 Shift : 2

Ans : (a) Suppose Principal = P

from the question-

$$\frac{P \times 6 \times x}{100} = \frac{1}{3}P$$

$$\Rightarrow \frac{6 \times x}{100} = \frac{1}{3} \Rightarrow x = \frac{100}{6 \times 3}$$

$$\Rightarrow x = \frac{50}{9} \Rightarrow x = 5\frac{5}{9}$$

Type - 6 Miscellaneous

93. If an amount doubles in 5 years, at the rate of simple interest how many times of the original amount, will it be after 8 years with same rate of simple interest?

- (a) $3\frac{3}{5}$ times (b) $2\frac{3}{5}$ times
(c) $2\frac{1}{5}$ times (d) $3\frac{2}{5}$ times

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let principal = ₹ P and Rate of interest = r %

Amount = ₹ 2P

Time (t) = 5 years

According to the question,

Amount = Principal + Interest

$$2P = P + \frac{P \times r \times 5}{100}$$

$$\Rightarrow P = \frac{P \times r}{20}$$

$$\Rightarrow r = 20$$

$$\therefore \text{Amount} = P + \frac{P \times 20 \times 8}{100}$$

$$= P + \frac{8P}{5}$$

$$= \frac{13P}{5} = 2\frac{3}{5}P$$

Hence at the rate of simple interest, this amount will become $2\frac{3}{5}$ times of itself after 8 years.

94. A sum of money (P) becomes twice in 10 years. How much will this amount become in 20 years at the same rate of simple interest?

- (a) P (b) 2P
(c) 3P (d) 4P

RRB NTPC 16.04.2016 Shift : 3

Ans : (c) From question

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$\text{According to the question, } (2P - P) = \frac{P \times R \times 10}{100}$$

$$R = 10\%$$

According to the second condition-

Total amount after 20 years = (P + SI)

$$= P + \frac{P \times 20 \times 10}{100}$$

$$= P + 2P = 3P$$

95. A person invested some amount at the rate of 12% per annum simple interest and some amount at the rate of 10% per annum simple interest. He received yearly interest of ₹125 from both the investments. But if he had interchanged the amounts invested, he would have received ₹3 more as interest. How much did he invest at 10 % per annum simple interest originally?

- (a) ₹600 (b) ₹700 (c) ₹500 (d) ₹650

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (d) : Let the amount at the rate of 12% simple interest = ₹ x

Invested amount at the rate of 10% simple interest = ₹ y

According to the question,

$$\frac{x \times 12 \times 1}{100} + \frac{y \times 10 \times 1}{100} = 125$$

$$6x + 5y = 6250 \text{ ————— (1)}$$

If interchanged the invested amount.

$$\text{Then, } \frac{x \times 10 \times 1}{100} + \frac{y \times 12 \times 1}{100} = 125 + 3 = 128$$

$$5x + 6y = 6400 \text{ ————— (2)}$$

On solving the eqn. (1) and (2),

$$x = 500, y = 650$$

Hence, invested originally amount at the 10% simple interest = ₹ 650

96. The simple interest is the $\frac{9}{16}$ th part of 'P' at a certain amount of 'P' and 'R'% per annum. If 'R' is equal to the number of years (N) then find the value of N.

- (a) 8.5 (b) 7 (c) 7.5 (d) 6

RRB NTPC 17.01.2017 Shift-2

Ans : (c) Given-

$$R = N \text{ [No. of years]}$$

According to the question-

$$\therefore \frac{9}{16}P = \frac{PRT}{100} \quad \left[\text{S.I.} = \frac{PRT}{100} \right]$$

$$\Rightarrow \frac{9}{16}P = \frac{P \times N \times N}{100}$$

$$\Rightarrow N^2 = \frac{9}{16} \times 100 = \left(\frac{30}{4} \right)^2$$

$$\Rightarrow N = 7.5$$

Hence the value of N is 7.5

15.

Compound Interest

Type - 1 Problems Based on Finding The Principal

1. A sum of money invested at 10% compound interest per annum amounts to ₹10,164 in 2 years interest compounded annually, what was the sum invested?

- (a) ₹8,300 (b) ₹8,400
(c) ₹8,200 (d) ₹8,800

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (b) : According to the question,

$$A = P \left(1 + \frac{r}{100} \right)^n$$

(A = Amount, P = Principal, n = Time, r = Rate)

$$10164 = P \left(1 + \frac{10}{100} \right)^2$$

$$\Rightarrow 10164 = P \times \frac{11}{10} \times \frac{11}{10}$$

$$\Rightarrow P = \frac{10164 \times 100}{121}$$

$$\therefore P = ₹8400$$

2. Rahul invested a certain sum for two years at 60% p.a. compound interest compounded annually. If at the end of two years he received interest of ₹ 11,700, then how much did he initially invest?

- (a) ₹ 8,000 (b) ₹ 7,250
(c) ₹ 7,750 (d) ₹ 7,500

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (d) : Let Principal = ₹ P

$$\text{Compound Interest} = \left[P \left(1 + \frac{R}{100} \right)^t \right] - P$$

$$11700 = \left[P \left(1 + \frac{60}{100} \right)^2 \right] - P$$

$$11700 = \left[P \left(\frac{8}{5} \right)^2 \right] - P$$

$$11700 = \frac{64P}{25} - P$$

$$11700 = \frac{64P - 25P}{25}$$

$$P = \frac{11700 \times 25}{39}$$

$$\therefore P = ₹ 7500$$

3. A certain sum was invested at 40% p.a compound interest for two years and the interest was compounded annually. If the interest was compounded half-yearly, the amount payable of maturity after two years would have been ₹ 4,544 more. What was the sum invested?

- (a) ₹ 42,500 (b) ₹ 40,000
(c) ₹ 42,000 (d) ₹ 37,500

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (b) : Let Amount = A

According to the question,

$$A_2 - A_1 = 4544$$

$$\Rightarrow P \left(1 + \frac{R_2}{100} \right)^{t_2} - P \left(1 + \frac{R_1}{100} \right)^{t_1} = 4544$$

$$\Rightarrow P \left(1 + \frac{20}{100} \right)^4 - P \left(1 + \frac{40}{100} \right)^2 = 4544$$

$$\Rightarrow P \left(\frac{6}{5} \right)^4 - P \left(\frac{7}{5} \right)^2 = 4544$$

$$\Rightarrow \frac{1296P}{625} - \frac{49P}{25} = 4544$$

$$\Rightarrow \frac{1296P - 1225P}{625} = 4544$$

$$\Rightarrow 71P = 4544 \times 625$$

$$\therefore P = \frac{4544 \times 625}{71}$$

$$\text{Hence, } P = ₹ 40000$$

4. A sum was invested for 3 years on compound interest at 6%, 12% and 18% in first, second and third year respectively. The sum amounts to ₹20,000 in 3 years. Find the principal amount

- (a) ₹14,276.58 (b) ₹12,276.12
(c) ₹13,572.46 (d) ₹10,276.43

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (a) : Amount =

$$\text{Principal amount} \times \left(1 + \frac{r_1}{100} \right) \left(1 + \frac{r_2}{100} \right) \left(1 + \frac{r_3}{100} \right)$$

$$20000 = \text{Principal amount} \times \left(1 + \frac{6}{100} \right) \left(1 + \frac{12}{100} \right) \left(1 + \frac{18}{100} \right)$$

$$\text{Principal amount} = \frac{20000 \times 50 \times 25 \times 50}{53 \times 28 \times 59}$$

$$= ₹ 14276.58$$

5. A sum of money, when invested at 10% compound interest per annum, amounts to ₹1,815 after 2 years. What is the original sum that was invested in the beginning?

- (a) ₹1512.50 (b) ₹1,475.00
(c) ₹1,500.00 (d) ₹1,550.00

RRB NTPC 17.02.2021 (Shift-II) Stage I

Ans. (c) : Given,

$$r = 10\%$$

$$t = 2 \text{ years}$$

$$P = ?$$

From formula-

$$A = P \left(1 + \frac{r}{100} \right)^n$$

$$1815 = P \left(1 + \frac{10}{100} \right)^2$$

$$P = \frac{1815 \times 100}{121}$$

$$P = ₹1,500$$

6. What is the principal amount which earns ₹154/- as a compound interest for the second year at 10% per annum?

- (a) ₹1,400.00 (b) ₹1,200.00
(c) ₹1,540.00 (d) ₹2,750.50

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (a) : If the compound interest rate for the first year is 10%

From option (a)-

$$\text{Compound interest for the first year} = \frac{1400 \times 10}{100} = ₹140$$

$$\text{Principal amount for the second year} = 140 + 1400 = ₹1540$$

$$\text{Compound interest for the second year} = \frac{1540}{100} \times 10 = ₹154$$

Therefore, option (a) is correct.

7. On what sum will the compound interest, at the rate of $12\frac{1}{2}\%$ per annum for 2 years compounded annually, be ₹6,800?

- (a) ₹27,200 (b) ₹54,400
(c) ₹27,260 (d) ₹25,600

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : Let the principal is x Rs.

Given-

$$\text{Rate (r)} = 12\frac{1}{2}\% = \frac{25}{2}\%$$

$$\text{Time (t)} = 2 \text{ years}$$

$$\text{Compound interest (CI)} = ₹ 6800$$

$$\therefore \text{CI} = A - P$$

$$6800 = x \left[\left(1 + \frac{25}{200} \right)^2 - 1 \right]$$

$$6800 = x \left[\frac{9}{8} \times \frac{9}{8} - 1 \right]$$

$$6800 = x \left[\frac{81}{64} - 1 \right]$$

$$6800 = \frac{17x}{64}$$

$$x = \frac{6800 \times 64}{17}$$

$$x = ₹ 25600$$

8. A person borrows a certain amount from a bank for 3 years at the rate of 7% compound interest annually. If he paid ₹85966 as total interest, then what was the amount borrowed?

- (a) ₹462,000 (b) ₹382,000
(c) ₹354,000 (d) ₹428,000

RRB NTPC 04.04.2016 Shift : 1

Ans : (b) Let borrowed amount = ₹x

$$\text{Amount (A)} = \text{Principal} + \text{Interest}$$

$$= x + 85966$$

$$\therefore A = P \left(1 + \frac{r}{100} \right)^n$$

$$x + 85966 = x \left(1 + \frac{7}{100} \right)^3$$

$$x + 85966 = x (1.07)^3$$

$$x + 85966 = 1.225043x$$

$$0.225043x = 85966$$

$$x = \frac{85966}{0.225043}$$

$$x = 381998.107, \quad x = ₹382000$$

9. A takes a fixed amount from a bank at the rate of 8% interest in which the interest compounded half yearly. If he paid ₹196851 after one and a half year, find the principal.

- (a) ₹ 168,000 (b) ₹ 175,000
(c) ₹ 179,000 (d) ₹ 184,000

RRB NTPC 31.03.2016 Shift : 3

Ans : (b) Given- Rate (r) = 8% per annum, = 4% Half yearly

$$\text{Time } n = 1 \text{ Year} = 2 \text{ Half yearly}$$

$$1.5 \text{ Years} = 3 \text{ Half yearly}$$

$$\text{Principal} = \frac{196851}{\left(1 + \frac{4}{100} \right)^3} = \frac{196851}{\left(\frac{26}{25} \right)^3}$$

$$= \frac{196851 \times 25 \times 25 \times 25}{26 \times 26 \times 26}$$

$$= 174999.82 = ₹175000$$

10. A fixed amount becomes ₹7200 in 2 years at a compound interest rate of 20% per annum. Find the principal amount.

- (a) ₹4800 (b) ₹6000
(c) ₹5400 (d) ₹5000

RRB NTPC 18.01.2017 Shift : 3

Ans : (d) From formula-

$$\text{Compound amount} = P \left(1 + \frac{r}{100} \right)^n$$

$$7200 = P \left(1 + \frac{20}{100} \right)^2$$

$$7200 = P \left(1 + \frac{20}{100} \right)^2$$

$$7200 = P \times \frac{36}{25}$$

$$P = 200 \times 25 = ₹5000$$

11. Calculate the principal if an amount of ₹441 is received on compound interest at the rate of 5% per annum after 2 years

- (a) ₹400 (b) ₹390
(c) ₹380 (d) ₹350

RRB NTPC 27.04.2016 Shift : 3

Ans : (a) As per the question,

$$\text{Amount} = \text{Principal} \left(1 + \frac{\text{Rate}}{100} \right)^{\text{Time}}$$

$$441 = \text{Principal} \left(1 + \frac{5}{100} \right)^2$$

$$441 = \text{Principal} \left(\frac{21}{20} \right)^2$$

$$441 = \text{Principal} \times \frac{441}{400}$$

$$\text{Principal} = \frac{441 \times 400}{441} = ₹400$$

12. Gitesh took a loan for 4 years at 5% compound interest. If the total interest paid was ₹431.01, Calculate the principal.

- (a) ₹2000 (b) ₹2050
(c) ₹2100 (d) ₹2150

RRB NTPC 27.04.2016 Shift : 3

Ans : (a) As per the question,

$$\text{Compound interest} = \text{Principal} \left[\left(1 + \frac{\text{Rate}}{100} \right)^{\text{Time}} - 1 \right]$$

$$431.01 = \text{Principal} \left[\left(1 + \frac{5}{100} \right)^4 - 1 \right]$$

$$431.01 = \text{Principal} \left[\frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} - 1 \right]$$

$$431.01 = \text{Principal} \left[\frac{194481}{160000} - 1 \right]$$

$$431.01 = \text{Principal} \left[\frac{194481 - 160000}{160000} \right]$$

$$431.01 = \text{Principal} \times \frac{34481}{160000}$$

$$\text{Principal} = \frac{431.01 \times 160000}{34481} = 1999.99 = ₹2000$$

13. If a certain amount becomes ₹6655 at a compound interest rate of 10% in 3 years. Find the amount.

- (a) ₹5000 (b) ₹5500
(c) ₹4500 (d) ₹4800

RRB NTPC 30.04.2016 Shift : 1

Ans : (a) From question,

$$A = P \left(1 + \frac{r}{100} \right)^n$$

$$6655 = P \left(1 + \frac{10}{100} \right)^3$$

$$6655 = \frac{1331P}{1000}$$

$$P = \frac{1000 \times 6655}{1331} = ₹5000$$

Type - 2 Problems Based on Finding The Amount

14. What will be the amount payable on maturity if ₹2,000 is invested for a period of three years of 30% p.a. interest compounded yearly?

- (a) ₹4,384 (b) ₹4,398
(c) ₹4,394 (d) ₹4,388

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (c) : Given,

$$P = ₹2000, r = 30\%, t = 3 \text{ years}$$

$$A = P \left(1 + \frac{r}{100} \right)^t$$

$$A = 2000 \left(1 + \frac{30}{100} \right)^3$$

$$= 2000 \times \frac{13}{10} \times \frac{13}{10} \times \frac{13}{10}$$

$$= 2 \times 2197$$

$$\therefore A = ₹4,394$$

15. If the rate of interest is 20% per annum and interest is compounded half yearly, then in 3/2 years a sum of ₹4000 will amount to:

- (a) ₹5,234 (b) ₹5,224
(c) ₹5,324 (d) ₹5,334

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (c) : $R = 20\%$ yearly $= 10\%$ half yearly

$$T = \frac{3}{2} \times 2 = 3 \text{ half yearly}$$

$$A = P \left(1 + \frac{R}{100} \right)^T$$

$$= 4000 \left(1 + \frac{10}{100} \right)^3$$

$$= 4000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$= ₹5324$$

16. A sum of ₹12,000.00 deposited at compound interest becomes double at the end of 5 years. At the end of 15 years the sum will be:

- (a) ₹ 1,20,000.00 (b) ₹ 96,000.00
(c) ₹ 1,08,000.00 (d) ₹ 84,000.00

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to first condition,

Principal = ₹ 12,000

Time = 5 years

Let, Rate = $r\%$ (yearly)

$$\text{Amount} = \text{Principal} \left(1 + \frac{\text{Rate}}{100} \right)^{\text{Time}}$$

$$2 \times 12000 = 12000 \left(1 + \frac{r}{100} \right)^5$$

$$\text{unit } 2 = \left(1 + \frac{r}{100} \right)^5 \dots\dots\dots (i)$$

According to second condition,

$$\text{Amount} = 12000 \left(1 + \frac{r}{100} \right)^{15}$$

$$= 12000 \left[\left(1 + \frac{r}{100} \right)^5 \right]^3$$

From equation (i),

$$\text{Amount} = 12000 \times 2^3$$

$$= 12000 \times 8 = ₹ 96000$$

17. Satya invested some amount in a fixed deposit what amount will he get on maturity if he invested ₹14500 at a 20% per annum compound interest rate at quarterly compounding for 6 months compounded quarterly.

- (a) ₹ 15,986.25 (b) ₹ 15,986.5
(c) ₹ 15,986.35 (d) ₹ 15,986

RRB NTPC 17.01.2017 Shift-3

Ans : (a) Invested amount = ₹14500

Time = 6 months = 2 quarterly

Rate = 20% per annum = $\frac{20}{4}\%$ quarterly = 5% quarterly

$$\therefore A = P \left(1 + \frac{r}{100} \right)^n$$

$$= 14500 \left(1 + \frac{5}{100} \right)^2 = 14500 \left(\frac{21}{20} \right)^2 = 14500 \times \frac{441}{400}$$

$$= ₹15986.25$$

18. A man deposits ₹ 500 at the beginning of each year for 2 years at 10% per annum compound annually. Find the maturity amount at the end of the 2nd year.

- (a) ₹1,050 (b) ₹1,150
(c) ₹1,155 (d) ₹1,200

RRB NTPC 05.04.2016 Shift : 3

Ans : (c)

$$\text{Amount at end of first year} = 500 \times \left(1 + \frac{10}{100} \right)^1$$

$$= 500 \times \frac{11}{10} = ₹550$$

$$\text{Principal for second year} = 500 + 550 = ₹1050$$

$$\text{Amount at end of second year} = 1050 \times \left(1 + \frac{10}{100} \right)^1$$

$$= 1050 \times \frac{11}{10} = ₹1155$$

$$\text{So maturity amount at end of second year} = ₹1155$$

19. Calculate the amount on ₹ 37500 at 8% per annum compounded half yearly for $1\frac{1}{2}$ years.

- (a) ₹42,182.40 (b) ₹42,000
(c) ₹42,120 (d) ₹42,812.40

RRB NTPC 28.03.2016 Shift : 1

Ans : (a) Given-

Principal (P) = ₹ 37500, $r = 8\%$ per annum = 4% Half yearly

$$\text{Time (t)} = 1\frac{1}{2} \text{ Years} = 3 \text{ Half yearly}$$

$$\text{Amount (A)} = P \left(1 + \frac{r}{100} \right)^t$$

$$= 37500 \left(1 + \frac{4}{100} \right)^3$$

$$= 37500 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25} = ₹42182.40$$

20. If Ram deposits ₹2000 in his saving account on which he gets 20% annual interest compounded half yearly. How much amount will be in his account after one year?

- (a) ₹3530 (b) ₹ 2420
(c) ₹2630 (d) ₹ 3870

RRB NTPC 18.01.2017 Shift : 3

Ans : (b) One year = 2 Half yearly

$$\text{Rate} = \frac{20}{2} \Rightarrow 10\%$$

$$\text{Amount} = 2000 \times \left(1 + \frac{10}{100} \right)^2$$

$$= 2000 \times \frac{11}{10} \times \frac{11}{10} = ₹2420$$

21. ₹10000 is being compounded at 20% per annum. Calculate the amount after 2 years if the rate of interest is charged half yearly.

- (a) ₹14600 (b) ₹12500
(c) ₹14642 (d) ₹14641

RRB NTPC 16.04.2016 Shift : 1

Ans : (d) Interest compounded half yearly

$$\text{Rate} = \frac{20}{2} = 10\%$$

$$\text{Time} = 2 \times 2 = 4 \text{ Years}$$

$$\therefore \text{Amount} = \text{Principal} \left(1 + \frac{\text{Rate}}{100}\right)^{\text{Time}}$$

$$= 10000 \left(1 + \frac{10}{100}\right)^4$$

$$= 10000 \left(1 + \frac{1}{10}\right)^4 = 10000 \left(\frac{11}{10}\right)^4$$

$$= 10000 \times \frac{14641}{10000} = ₹14641$$

22. Mr. Vagish invested money in FD. How much amount will he get at maturity, if ₹4500 invested for 6 months at a compound interest rate of 20% annually and the interest is compounded quarterly?

- (a) ₹4961.5 (b) ₹4961.25
(c) ₹4961.35 (d) ₹4961

RRB NTPC 11.04.2016 Shift : 3

Ans : (b) Rate (r) = $\frac{20}{4} = 5\%$

Time (n) = 2 quarterly

$$\text{Amount (A)} = P \left(1 + \frac{r}{100}\right)^n = 4500 \left(1 + \frac{5}{100}\right)^2$$

$$= 4500 \times \frac{21}{20} \times \frac{21}{20} = ₹4961.25$$

23. A person named Shri Ram invested ₹14000 in FD (fixed deposit) How much amount will he get on maturity if he invested it at 20% per annum compound interest for 6 months compounded quarterly?

- (a) ₹15,437 (b) ₹15,434
(c) ₹15,436 (d) ₹15,435

RRB NTPC 19.01.2017 Shift : 3

Ans : (d) Principal (P) = ₹14000

When rate is payable quarterly then rate

$$= \frac{\text{Annual rate}}{4} = \frac{20}{4} = 5\%$$

Time (n) = 6 months = 2 quarterly

$$A = P \left(1 + \frac{R}{100}\right)^n$$

$$A = 14000 \left(1 + \frac{5}{100}\right)^2 \Rightarrow A = 14000 \times \left(\frac{21}{20}\right)^2$$

$$\Rightarrow 14000 \times \frac{441}{400} = 441 \times 35 = ₹15435$$

24. Mr. Yashwant invested money in FD. What will be the total amount on maturity if ₹10000 is invested at a rate of 20% compound interest annually for 6 months, compounded quarterly?

- (a) ₹11025.25 (b) ₹11025
(c) ₹11025.75 (d) ₹11025.5

RRB NTPC 22.04.2016 Shift : 2

Ans : (b) Principal (P) = ₹10000, r = 20% annually

$$= \frac{20}{4} \% \text{ quarterly, } r = 5\% \text{ quarterly}$$

Time (n) = 6 months

= 2 quarterly

$$\text{Amount} = P \left(1 + \frac{r}{100}\right)^n$$

$$= 10,000 \left(1 + \frac{5}{100}\right)^2$$

$$= 10,000 \left(1 + \frac{1}{20}\right)^2$$

$$= 10,000 \left(\frac{21}{20}\right)^2$$

$$= 10,000 \times \frac{21}{20} \times \frac{21}{20} = ₹11025$$

25. Mr. Akhil invested ₹13500 in a fixed deposit find the total money for 6 months at the rate of compound interest of 20% per annum if the interest is compounded quarterly.

- (a) ₹14,883.35 (b) ₹14,883.75
(c) ₹14,883.5 (d) ₹14,883

RRB NTPC 19.01.2017 Shift : 1

Ans : (b) When Rate is payable quarterly

$$= \frac{20}{4} = 5\%$$

Time = 6 months = 2 quarters

As per the question,

$$\text{Amount} = \text{Principal} \left(1 + \frac{\text{Rate}}{100}\right)^{\text{Time}}$$

$$= 13500 \left[1 + \frac{5}{100}\right]^2$$

$$= 13500 \times \frac{21 \times 21}{20 \times 20} = ₹14883.75$$

Type - 3

Problems Based on Finding The Compound Interest

26. Find the compound interest on ₹100000 at 20% per annum for 3 years 3 months compounded annually.

- (a) ₹ 81440 (b) ₹ 65000
(c) ₹ 71650 (d) ₹ 82360

RRB NTPC (Stage-II) –16/06/2022 (Shift-I)

Ans. (a) : $A = P \left(1 + \frac{R}{100}\right)^t$ Interest (C_1) = $A - P$

Given,

Principal = ₹100000, Rate (r) = 20%,

Time (t) = $3\frac{1}{4}$ Years

$$A = 100000 \left(1 + \frac{20}{100}\right)^3$$

$$= 100000 \times \frac{216}{125}$$

$$= 172800$$

$$\text{Interest of } \frac{1}{4} \text{ years} = \frac{P \times R \times T}{100} = \frac{172800 \times 20 \times 1}{100 \times 4} = 8640$$

$$\text{Total Amount} = 172800 + 8640 = 181440$$

$$\text{Compound Interest} = \text{Amount} - \text{Principal} = 181440 - 100000 = ₹81440$$

27. A sum of ₹14000 amounts to ₹18515 in 2 years at a certain rate percent p.a., interest compounded yearly. What will be the compound interest on the same sum, in the same time and at the same rate, if the interest is compounded 8-monthly?

- (a) ₹3,234 (b) ₹4,494
(c) ₹4,620 (d) ₹4,634

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (d) :

$$A = P \left(1 + \frac{R}{100}\right)^t$$

$$18515 = 14000 \left(1 + \frac{R}{100}\right)^2$$

$$\frac{18515}{14000} = \left(1 + \frac{R}{100}\right)^2$$

$$\frac{529}{400} = \left(1 + \frac{R}{100}\right)^2$$

$$\left(\frac{23}{20}\right)^2 = \left(1 + \frac{R}{100}\right)^2$$

$$\frac{R}{100} = \frac{3}{20}$$

$$R = 15\%$$

If the interest is compounded 8-monthly

$$12 \text{ month} = 15\%$$

$$8 \text{ month} = 10\%$$

$$R = 10\%, T = 3 \text{ (8 monthly)}$$

$$C.I. = P \left[\left(1 + \frac{R}{100}\right)^t - 1 \right]$$

$$= 14000 \left[\left(1 + \frac{10}{100}\right)^3 - 1 \right]$$

$$= 14000 \left[\frac{1331}{1000} - 1 \right]$$

$$= 14 \times 331 = ₹4634$$

28. What is the compound interest on a sum of ₹19,500 invested for $1\frac{2}{5}$ years at 10% p.a. interest compounded annually?

- (a) ₹ 2,808 (b) ₹ 2,608
(c) ₹ 2,880 (d) ₹ 2,480

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (a) : Given,

Principal (P) = ₹19500,

Rate (R) = 10%,

Time (T) = $1\frac{2}{5}$

$$C.I. = 19500 \left[\left(1 + \frac{10}{100}\right)^1 \left(1 + \frac{10 \times 2}{100 \times 5}\right) - 1 \right]$$

$$= 19500 \left[\frac{11}{10} \times \frac{26}{25} - 1 \right]$$

$$= 19500 \left[\frac{286 - 250}{250} \right]$$

$$= 19500 \times \frac{36}{250}$$

$$= ₹2808$$

29. Khan lends an amount of ₹10,000 to Irfan at 10% per annum compound for 5 year, compounded annually. What is the compound interest accrued for the 4th year?

- (a) ₹ 1,762 (b) ₹ 1,540
(c) ₹ 1,331 (d) ₹ 1,745

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,

Principal (P) = ₹10000

Time (T) = 5 years

Rate (R) = 10%

$$\therefore A = P \left(1 + \frac{R}{100}\right)^T$$

According to the question,

CI for 4th year

$$= 10000 \left[\left(1 + \frac{10}{100}\right)^4 - \left(1 + \frac{10}{100}\right)^3 \right]$$

$$= 10000 \left[\left(\frac{11}{10}\right)^4 - \left(\frac{11}{10}\right)^3 \right]$$

$$= 10000 \left[\left(\frac{11}{10}\right)^3 \times \left(\frac{11}{10} - 1\right) \right]$$

$$= 10000 \left[\frac{1331}{1000} \times \frac{1}{10} \right]$$

$$= ₹1331$$

- 30. What is the compound interest (in ₹) on a sum of ₹ 31600 for $1\frac{1}{3}$ years at 9% p.a., when the interest is compounded 8-monthly? (Nearest to a ₹)**

- (a) ₹ 3928 (b) ₹ 3916
(c) ₹ 3906 (d) ₹ 3896

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (c) : Given,

P = ₹ 31600

Rate (R) = 9% Annual

Rate as per 8 monthly basis = $\frac{8}{12} \times 9 = 6\%$

Time = $1\frac{1}{3}$ year = 2 (8-month)

According to the question,

$$\text{Amount (A)} = P \times \left(1 + \frac{R}{100}\right)^t$$

$$= 31600 \times \left(1 + \frac{6}{100}\right)^2$$

$$= 31600 \times \frac{106}{100} \times \frac{106}{100}$$

$$A = 35505.76$$

Then,

$$\begin{aligned} \text{Interest} &= \text{Amount (A)} - \text{Principal (P)} \\ &= 35505.76 - 31600 = 3905.76 \\ &= ₹ 3906 \end{aligned}$$

- 31. What will be the interest on the amount of ₹25,000 compounded annually at the rate of 4%, 5% and 6% per annum for the first, second and third year respectively ?**

(a) ₹3838

(b) ₹3839

(c) ₹3938

(d) ₹3939

RRB NTPC 13.03.2021 (Shift-I) Stage I

Ans. (c) : Amount

$$= \text{Principal} \times \left(1 + \frac{r_1}{100}\right) \times \left(1 + \frac{r_2}{100}\right) \times \left(1 + \frac{r_3}{100}\right) \dots \left(1 + \frac{r_n}{100}\right)$$

$$\begin{aligned} \text{Amount} &= 25000 \times \frac{104}{100} \times \frac{105}{100} \times \frac{106}{100} \\ &= 28938 \end{aligned}$$

$$\therefore \text{Compound interest} = 28938 - 25000 = ₹3938$$

- 32. What will be the compound interest on a sum of ₹25,000 after 3 years at a rate of 12% per annum, compounded annually?**

- (a) ₹ 900.30 (b) ₹ 10,123.20
(c) ₹ 1,048.20 (d) ₹ 9,720

RRB NTPC 08.02.2021 (Shift-II) Stage I

Ans. (b) : Given, P = ₹ 25000

r = 12%

t = 3 years

$$A = P \left(1 + \frac{r}{100}\right)^t$$

$$= 25000 \left(1 + \frac{12}{100}\right)^3$$

$$= 25000 \times \left(\frac{28}{25}\right)^3$$

$$= 25000 \times \frac{28}{25} \times \frac{28}{25} \times \frac{28}{25}$$

$$= \frac{40 \times 21952}{25}$$

$$= 35123.2$$

$$\begin{aligned} \therefore \text{C.I} &= A - P \\ &= 35123.2 - 25000 \end{aligned}$$

$$\text{C.I} = ₹ 10, 123.20$$

- 33. Find the compound interest when the principal is ₹6,000 at an interest of 10% per annum for 2 years.**

- (a) ₹1,240 (b) ₹1,250
(c) ₹1,260 (d) ₹1,230

RRB NTPC 29.01.2021 (Shift-II) Stage I

$$\text{Ans. (c) : } A = P \left[1 + \frac{r}{100}\right]^n$$

$$A = 6000 \left[1 + \frac{10}{100}\right]^2$$

$$A = 6000 \times \frac{11}{10} \times \frac{11}{10}$$

$$A = 60 \times 121$$

$$A = 7260$$

$$\begin{aligned} \therefore \text{CI} &= A - P \\ &= 7260 - 6000 \\ &= ₹1260 \end{aligned}$$

34. Find the compound interest on ₹20000/- in 2 years at 8% per annum, if interest is compounded yearly?

- (a) ₹3,220.00 (b) ₹3109.78
(c) ₹3328.00 (d) ₹3200.00

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

Principal - 20000, Rate- 8%, Time- 2 years

$$\text{Amount} = \text{Principal} \left(1 + \frac{r}{100}\right)^t$$

$$= 20000 \left(1 + \frac{8}{100}\right)^2$$

$$= 20000 \times \frac{108}{100} \times \frac{108}{100}$$

$$= 23328$$

$$\text{CI} = \text{A} - \text{P}$$

$$= 23328 - 20000$$

$$= ₹3328$$

35. ₹200 was invested for 2 years on 10% compound interest per year. If the rate of interest had been 20%, then how much more would the investor have received as interest for the same period?

- (a) ₹46 (b) ₹48
(c) ₹40 (d) ₹44

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (a) : If, P = ₹200, R = 10% and T = 2 years

$$\text{Then, } A = 200 \left(1 + \frac{10}{100}\right)^2$$

$$A = 200 \times \frac{11}{10} \times \frac{11}{10}$$

$$A = 2 \times 121$$

$$A = 242$$

$$\text{CI} = \text{A} - \text{P}$$

$$= 242 - 200$$

$$\text{CI} = ₹42$$

Take the interest, R = 20%

$$\text{Then, } A = 200 \times \left(1 + \frac{20}{100}\right)^2$$

$$A = ₹288$$

$$\text{CI} = 288 - 200$$

$$= ₹88$$

$$\text{Extra} = 88 - 42 = ₹46$$

36. The compound interest on a sum of ₹7,500 for 2 years at 4% p.a. is.

- (a) ₹612 (b) ₹515
(c) ₹850 (d) ₹750

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (a) : Required rate of two years at 4% p.a.

$$4 + 4 + \frac{4 \times 4}{100} = 8.16\%$$

$$\text{C.I} = 7500 \times \frac{8.16}{100}$$

$$= ₹ 612$$

37. What is the difference between the compound interest on a sum of ₹5000 for $1\frac{1}{2}$ years at 4% per annum compounded yearly and half-yearly ?

- (a) ₹ 2.90 (b) ₹ 2.04
(c) ₹ 3.40 (d) ₹ 3.61

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b) : Given,

Principal (P) = ₹ 5000

Rate (r) = 4%

Time (t) = $1\frac{1}{2}$ years

Yearly Compound Interest = A - P

$$= P \left(1 + \frac{r}{100}\right)^t - P$$

$$= 5000 \left(1 + \frac{4}{100}\right) \left(1 + \frac{4}{100} \times \frac{1}{2}\right) - 5000$$

$$= 5304 - 5000$$

$$= ₹ 304$$

Half yearly Compound Interest →

$$r = \frac{4\%}{2} = 2\% \text{ Half-yearly}$$

$$t = 1\frac{1}{2} \text{ years} = 3 \text{ Half-yearly}$$

So, CI = A - P

$$= 5000 \left(1 + \frac{2}{100}\right)^3 - 5000$$

$$= 5000 \times \frac{102}{100} \times \frac{102}{100} \times \frac{102}{100} - 5000$$

$$= 5306.04 - 5000 = ₹ 306.04$$

Difference of Compound Interest

$$= 306.04 - 304 = ₹ 2.04$$

38. Find the compound interest on the amount of ₹ 1200 at the rate of 12% p.a. for 6 months compounded quarterly.

- (a) ₹71.08 (b) ₹74.08
(c) ₹72.08 (d) ₹73.08

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : Given - $P = ₹1200$

$r = 12\%$ yearly = 3% quarterly

$t = 6$ months = 2 quarterly

Calculation of interest compounded quarterly, the amount

$$A = P \left(1 + \frac{r}{100} \right)^t$$

$$A = 1200 \left(1 + \frac{3}{100} \right)^2$$

$$A = 1200 \left(\frac{103}{100} \right) \left(\frac{103}{100} \right)$$

$$A = 1273.08$$

So, C.I = $A - P$

$$= 1273.08 - 1200$$

$$= ₹73.08$$

39. An amount of ₹100 was invested for two years at the rate of 10% compound interest per annum. If the rate of interest is increased to 20% for the same period, how much extra money will get the investor as interest.

- (a) ₹23/- (b) ₹20/-
(c) ₹22/- (d) ₹24/-

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,

Extra interest =

$$100 \left[\left(1 + \frac{20}{100} \right)^2 - 1 \right] - 100 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right]$$

$$= 100 \left[\frac{6}{5} \times \frac{6}{5} - 1 \right] - 100 \left[\frac{11}{10} \times \frac{11}{10} - 1 \right]$$

$$= 100 \left[\frac{36 - 25}{25} \right] - 100 \left[\frac{121 - 100}{100} \right]$$

$$= 4 \times 11 - 21$$

$$= 44 - 21$$

$$= ₹ 23$$

40. Find the interest (in ₹) on ₹ 8000 at 10% per annum compounded half yearly for $1\frac{1}{2}$ years.

- (a) 1,263 (b) 1,264
(c) 1,261 (d) 1,260

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c) : Principal = ₹ 8000, Rate of interest = 10%,

Time (t) = $1\frac{1}{2}$ years

Interest is calculated half yearly

∴ R = 5%, t = 3 half yearly

$$\therefore A = P \left(1 + \frac{R}{100} \right)^t = 8000 \left(1 + \frac{5}{100} \right)^3 = 8000 \times \frac{9261}{8000}$$

$$\therefore A = ₹ 9261$$

$$\therefore \text{Compound interest} = A - P = 9261 - 8000 = ₹ 1261$$

41. Find the compound interest on ₹5,000 at the rate of 6% per annum for 3 years, compounded annually (correct to the nearest integer).

- (a) ₹ 900 (b) ₹ 618
(c) ₹ 956 (d) ₹ 955

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (d) : Given-

Time = 3 years

Rate = 6% yearly, Principal = ₹ 5000

$$\text{Amount} = 5000 \times \left(1 + \frac{6}{100} \right)^3$$

$$\Rightarrow 5000 \times \frac{106 \times 106 \times 106}{100 \times 100 \times 100} = \frac{59550800}{10000} = ₹ 5955.08$$

Compound Interest = Amount - Principal

$$= 5955.08 - 5000$$

$$= 955.08 \text{ or } ₹ 955$$

42. Calculate the compound interest on ₹15,000 in one year at 4% per annum, if the interest is compounded half yearly.

- (a) ₹600 (b) ₹5606
(c) ₹6060 (d) ₹606

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

Principal = ₹15000

Rate = 2% half yearly

Time = 2 half yearly

According to the question,

$$\text{Amount} = \text{Principal} \left(1 + \frac{R}{100} \right)^{\text{Time}} \quad (R \rightarrow \text{Rate})$$

$$= 15000 \left(1 + \frac{2}{100} \right)^2$$

$$= 15000 \times \frac{102}{100} \times \frac{102}{100}$$

Amount = ₹15606

C.I. = Amount - Principal

$$= 15606 - 15000$$

$$= ₹606$$

43. Calculate the compound interest on a sum of ₹12,000 at 16% p.a. for 3 months, compounded quarterly.

- (a) ₹ 480 (b) ₹ 1200
(c) ₹ 500 (d) ₹ 400

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given, time (t) = 1 quarterly,

$$\text{rate } (r) = \frac{16}{4} = 4\% \text{ quarterly}$$

$$\text{So, Compound Interest (C.I.)} = P \left[\left(1 + \frac{r}{100} \right)^t - 1 \right]$$

$$\text{C. I.} = 12000 \left[\left(1 + \frac{4}{100} \right)^1 - 1 \right]$$

$$= 12000 \times \frac{4}{100}$$

$$\text{C.I.} = ₹480$$

44. What will be the compound interest of ₹172000 for 3 years, at the rate of 8% (rounded off to the nearest ₹) per annum.

- (a) ₹44,670 (b) ₹11,667
(c) ₹41,280 (d) ₹46,470

RRB NTPC 04.04.2016 Shift : 2

Ans : (a) Given-

Principal (P) = ₹172000,

Rate = 8% annually

Time (n)=3 Years

$$C.I = P \left(1 + \frac{r}{100} \right)^n - P = P \left[\left(1 + \frac{r}{100} \right)^n - 1 \right]$$

$$= 172000 \left[\left(1 + \frac{8}{100} \right)^3 - 1 \right]$$

$$= 172000 \left[\left(\frac{27}{25} \right)^3 - 1 \right]$$

$$= 172000 \left[\frac{19683}{15625} - 1 \right]$$

$$= 172000 \times \frac{19683 - 15625}{15625}$$

$$= 11.008 \times 4058 = 44,670$$

45. Find the compound interest at ₹7500 on the rate of 12% per annum for 2 years 4 months to the nearest rupee, this interest is calculated on an annual basis?

- (a) 2284 (b) 2176
(c) 2097 (d) 2235

RRB NTPC 03.04.2016 Shift : 1

Ans : (a) Given,

Principal (P) = ₹ 7500, $t = 2\frac{1}{3}$ Years, $r = 12\%$ per annum

$$\text{Amount (A)} = P \left(1 + \frac{r}{100} \right)^t$$

$$= 7500 \left(1 + \frac{12}{100} \right)^{2\frac{1}{3}}$$

$$= 7500 \left(1 + \frac{3}{25} \right)^2 \left(1 + \frac{3}{25} \right)^{\frac{1}{3}}$$

$$= 7500 \times \frac{28}{25} \times \frac{28}{25} \times \left(1 + \frac{1}{3} \times \frac{3}{25} \right)$$

$$= 7500 \times \frac{28}{25} \times \frac{28}{25} \times \frac{26}{25} = ₹ 9784.32$$

So, Compound interest = ₹ 9784.32 - 7500 = ₹ 2284.32

So, compound interest will be rounded off to the nearest ₹2284.

46. What will be the compound interest on ₹24000 in 2 years at 25% per annum if the interest is compounded annually.

- (a) ₹37,500 (b) ₹13,500
(c) ₹38,400 (d) ₹36,400

RRB NTPC 03.04.2016 Shift : 3

Ans : (b) From question,

$$\text{Compound interest (C.I.)} = \left[P \left(1 + \frac{r}{100} \right)^n - P \right]$$

$$= 24000 \left(1 + \frac{25}{100} \right)^2 - 24000$$

$$= 24000 \left(1 + \frac{1}{4} \right)^2 - 24000$$

$$= 24000 \left(\frac{5}{4} \right)^2 - 24000 = 24000 \left[\frac{25}{16} - 1 \right]$$

$$= 24000 \left(\frac{25-16}{16} \right) = 24000 \times \frac{9}{16} = ₹13,500$$

47. If the interest is compounded annually, then what will be the compound interest on ₹ 4800 for 2 years at the rate of 20% per annum?

- (a) ₹69,120 (b) ₹21,120
(c) ₹76,800 (d) ₹72,000

RRB NTPC 02.04.2016 Shift : 2

Ans : (b) Given, Principal = ₹48000, Rate = 20%
Time = 2 years

$$\text{Amount} = P \left(1 + \frac{r}{100} \right)^T = 48000 \left(1 + \frac{20}{100} \right)^2$$

$$= 48000 \left(1 + \frac{1}{5} \right)^2 = 48000 \left(\frac{6}{5} \right)^2$$

$$= 48000 \times \frac{6}{5} \times \frac{6}{5} = ₹69120$$

So, Compound interest = Amount - Principal
= 69120 - 48000 = ₹21120

48. Ibrahim borrowed ₹7500 at an annual compound interest rate of 5%. What will be the compound interest after 2 years if the interest compounded annually.

- (a) ₹768.75 (b) ₹8268.75
(c) ₹8286.75 (d) ₹786.75

RRB NTPC 11.04.2016 Shift : 1

Ans : (a) Given, Principal = ₹7500

Annual Rate (R) = 5%

Time (t) = 2 Years

$$\text{Compound interest} = P \left[\left(1 + \frac{R}{100} \right)^t - 1 \right]$$

$$= 7500 \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right]$$

$$= 7500 \left[\left(\frac{21}{20} \right)^2 - 1 \right] = 7500 \left[\frac{441}{400} - 1 \right]$$

$$= 7500 \left[\frac{441 - 400}{400} \right] = 7500 \times \frac{41}{400}$$

$$= ₹768.75$$

49. Harsh borrowed ₹8000 at an annual rate of 4% compound interest. What will be the compound interest after 2 years if the interest is compounded annually.

(a) ₹ 652.8 (b) ₹ 8,652.8
(c) ₹ 8,625.8 (d) ₹ 625.8

RRB NTPC 07.04.2016 Shift : 2

Ans : (a)

$$\begin{aligned}\text{Compound interest} &= \text{Principal} \left[\left(1 + \frac{\text{Rate}}{100} \right)^{\text{Time}} - 1 \right] \\ &= 8000 \left[\left(1 + \frac{4}{100} \right)^2 - 1 \right] \\ &= 8000 \left[\left(\frac{26}{25} \right)^2 - 1 \right] \\ &= 8000 \left[\frac{676 - 625}{625} \right] \\ &= 8000 \times \frac{51}{625} \\ &= \frac{64 \times 51}{5} \\ &= \frac{3264}{5} \\ &= ₹ 652.8\end{aligned}$$

50. Mr. Ayush borrowed ₹3000 at the rate of 5% compound interest annually. What will be the compound interest for 2 years?

(a) ₹370.5 (b) ₹307.5
(c) ₹3307.5 (d) ₹3370.5

RRB NTPC 19.01.2017 Shift : 1

Ans : (b) C.I. = $P \left(1 + \frac{r}{100} \right)^n - P$

$$\begin{aligned}\text{C.I.} &= 3000 \left(1 + \frac{5}{100} \right)^2 - 3000 \\ &= 3000 \left[\left(\frac{21}{20} \right)^2 - 1 \right] \\ &= 3000 \left(\frac{441}{400} - 1 \right) \\ &= 3000 \times \frac{41}{400} \\ &= 7.5 \times 41 = ₹307.5\end{aligned}$$

51. Mr. Paritosh borrowed ₹4,500 at the rate of 5% compound interest. If the interest is compounded annually, what will be the compound interest for 2 years?

(a) ₹4961.25 (b) ₹461.25
(c) ₹4916.25 (d) ₹416.25

RRB NTPC 30.04.2016 Shift : 3

Ans : (b) $P = 4500$, $r = 5\%$, $t = 2$ years, $CI = ?$

$$\begin{aligned}A &= P \left(1 + \frac{r}{100} \right)^t \\ A &= 4500 \left(1 + \frac{5}{100} \right)^2 \\ &= 4500 \left(1 + \frac{1}{20} \right)^2 \\ &= 4500 \left(\frac{21}{20} \right)^2 \\ &= 4500 \times \frac{21}{20} \times \frac{21}{20} \\ &= 4961.25 \\ \text{So, } CI &= A - P \\ CI &= 4961.25 - 4500 = ₹461.25\end{aligned}$$

52. The present worth of ₹ 338 due in 2 years at 4% per annum compound interest is : _____

(a) ₹ 365.58 (b) ₹ 350.50
(c) ₹ 294.00 (d) ₹ 312.50

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : From formula-

$$\begin{aligned}A &= P \left(1 + \frac{R}{100} \right)^T \\ 338 &= P \left(1 + \frac{4}{100} \right)^2 \\ 338 &= P \left(\frac{26}{25} \right)^2 \\ P &= \frac{338 \times 625}{676} \\ &= ₹312.50\end{aligned}$$

Type - 4 Combined Problems of Simple and Compound Interest

53. Sunil and Kamal took loan of ₹40,000 each for 1 year 6 months from a money lender who charged simple interest from Sunil a 11% per annum and compound interest from Kamal 10% per annum compounded semi-annually. Who paid more interest and by what amount?

(a) Kamal paid ₹305 more
(b) Kamal paid ₹195 more
(c) Sunil paid ₹295 more
(d) They paid equal interest

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (c) : Sunil for ₹40000 at the rate of simple interest,

$$SI = \frac{40000 \times 11 \times 18}{100 \times 12} = 200 \times 11 \times 3 = ₹6600$$

P = ₹40000, R = 10% yearly = 5% (half-yearly)

t = 1 year 6 months = 3 half-yearly

$$\therefore CI = A - P$$

$$= 40000 \left(1 + \frac{5}{100} \right)^3 - 40000$$

$$= 40000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} - 40000$$

$$= 5 \times 21 \times 21 \times 21 - 40000$$

$$CI = 46305 - 40000 = ₹6305$$

The interest paid by Sunil and Kamal in 1 year 6 months (difference) = 6600 - 6305 = ₹295

Hence, Sunil paid ₹295 more interest.

- 54. If the simple interest of a certain sum of money for 3 years at 8% p.a. is half the compound interest on ₹ 4,000 for 2 years at 10% p.a. then the sum placed on simple interest is:**

- (a) ₹ 1,750 (b) ₹ 1,650
(c) ₹ 1,550 (d) ₹ 2,000

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the invested money at simple interest = ₹x

According to the question,

$$\frac{2x \times 8 \times 3}{100} = 4000 \left(1 + \frac{10}{100} \right)^2 - 4000$$

$$\frac{48x}{100} = 4000 \times \frac{11 \times 11}{100} - 4000$$

$$\frac{48x}{100} = 4840 - 4000$$

$$48x = 840 \times 100$$

$$x = \frac{84000}{48}$$

$$x = ₹ 1,750$$

Therefore, invested money at simple interest (x) = ₹ 1,750

- 55. The compound interest on a sum of money at 5% per annum for 3 years is ₹ 6305 Find the simple interest (in ₹) for the same sum at the same rate of interest for the same number of years.**

- (a) ₹4,000 (b) ₹6,000
(c) ₹5,000 (d) ₹3,600

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let amount = ₹P

Given,

r = 5% yearly

n = 3 years

$$C.I. = P \left[\left(1 + \frac{r}{100} \right)^n - 1 \right]$$

$$6305 = P \left[\left(1 + \frac{5}{100} \right)^3 - 1 \right]$$

$$6305 = P \left[\frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} - 1 \right]$$

$$6305 = P \left[\frac{9261 - 8000}{8000} \right]$$

$$6305 = P \left[\frac{1261}{8000} \right]$$

$$P = 5 \times 8000$$

$$P = ₹40,000$$

$$S.I. = \frac{P \times r \times t}{100}$$

$$= \frac{40000 \times 5 \times 3}{100} = ₹6000$$

- 56. If the compound interest on a certain sum of money for 3 years at 5% per annum is ₹3783, then what would be the simple interest on the same sum of money for the same period and at the same rate?**

- (a) ₹3,400 (b) ₹3,680
(c) ₹3,600 (d) ₹3,440

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$CI = ₹3783, \quad R = 5\%, \quad T = 3 \text{ years}$$

$$CI = A - P$$

$$3783 = P \left(1 + \frac{5}{100} \right)^3 - P$$

$$3783 = P \left(\frac{21}{20} \right) \left(\frac{21}{20} \right) \left(\frac{21}{20} \right) - P$$

$$3783 = \frac{9261P - 8000P}{8000}$$

$$P = \frac{3783 \times 8000}{1261}$$

$$P = ₹24000$$

For the same period at the same rate on the same sum of money.

$$\text{Simple interest} = \frac{P \times R \times T}{100}$$

$$= \frac{24000 \times 5 \times 3}{100}$$

$$= ₹3600$$

- 57. There is 60% increase in the amount in 6 years at simple interest. What will be the compound interest of ₹10000 after 3 years at the same rate?**

- (a) ₹13,300 (b) ₹3,310
(c) ₹13,500 (d) ₹3,500

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (b) : Rate of simple interest = $\frac{60\%}{6} = 10\%$

$$\begin{aligned}\text{C.I. of 3 years} &= P \left[\left(1 + \frac{R}{100} \right)^t - 1 \right] \\ &= 10000 \left[\left(1 + \frac{10}{100} \right)^3 - 1 \right] \\ &= 10000 \left[\frac{1331}{1000} - 1 \right] \\ &= 10000 \times \frac{331}{1000} \\ &= ₹ 3310\end{aligned}$$

58. Zaved borrowed ₹10000 for 2 years on compound interest, compounded annually and paid ₹12544 at the end of 2 years. If he had borrowed the amount on simple interest, then how much money he would have saved?

- (a) ₹144 (b) ₹12,400
(c) ₹4,944 (d) ₹2,400

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question –

$$\begin{aligned}\left(1 + \frac{r}{100} \right)^2 &= \frac{12544}{10000} \\ 1 + \frac{r}{100} &= \frac{112}{100} \\ \frac{r}{100} &= \frac{12}{100} \\ r &= 12\%\end{aligned}$$

Compound interest = 12544 – 10000 = ₹ 2544

$$\text{Simple interest} = \frac{10000 \times 12 \times 2}{100} = ₹ 2400$$

So, Saved money = 2544 – 2400
= ₹ 144

59. Amrit borrowed some amount at 10% per annum on simple interest for 1 year, Abhishek borrowed the same amount at the same rate on compound interest (compounded semi-annually) for the same period. If Abhishek paid ₹50 more than Amrit as interest what amount did each of them borrow :

- (a) ₹20,010 (b) ₹19,950
(c) ₹20,050 (d) ₹20,000

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let principal = ₹P

Time for simple interest = Time for compound interest

Rate = 10% yearly or 5% Half yearly

Time = 1 year Time = 1 year = 2 Half yearly

According to the question –

$$50 = P \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right] - \frac{P \times 10 \times 1}{100}$$

$$50 = P \left[\frac{21}{20} \times \frac{21}{20} - 1 \right] - \frac{P}{10}$$

$$50 = P \left[\frac{441 - 400}{400} \right] - \frac{P}{10}$$

$$50 = P \left[\frac{41}{400} - \frac{1}{10} \right]$$

$$50 = P \left[\frac{41 - 40}{400} \right]$$

or, $P = 50 \times 400 = ₹20,000$

60. The compound interest on a certain sum of money at the rate of 11% p.a. for 2 years is ₹4642. Find its simple interest at the same rate and for the same period.

- (a) ₹4,200 (b) ₹3,500
(c) ₹4,500 (d) ₹4,400

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (d) : Compound Interest = $P \left(1 + \frac{R}{100} \right)^t - P$

$$4642 = P \left[\left(1 + \frac{11}{100} \right)^2 - 1 \right]$$

$$\begin{aligned}4642 &= P \times \frac{2321}{10000} \\ P &= ₹20,000\end{aligned}$$

$$\begin{aligned}\text{Simple interest} &= \frac{20000 \times 11 \times 2}{100} \\ &= ₹44,00\end{aligned}$$

61. The simple interest on a sum of amount for 2 years at 10% per annum is ₹500. The compound interest on the same sum at the same rate for the same time is:

- (a) ₹ 510 (b) ₹ 525
(c) ₹ 520 (d) ₹ 515

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : Let principal amount = ₹ P

Rate = 10% annually

Time = 2 years

According to the question,

$$\begin{aligned}500 &= \frac{P \times 10 \times 2}{100} \\ P &= ₹2500\end{aligned}$$

$$\begin{aligned}\text{Compound interest} &= 2500 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right] \\ &= 2500 \left[\frac{11}{10} \times \frac{11}{10} - 1 \right] \\ &= 2500 \left[\frac{121 - 100}{100} \right] \\ &= 2500 \times \frac{21}{100} \\ &= ₹ 525\end{aligned}$$

62. The simple interest of 8 years at 8% per annum on a deposit is ₹16000. What will be the compound interest of 2 years at the rate of one fourth of this rate on the same amount.

- (a) ₹ 1,020 (b) ₹ 980
(c) ₹ 1,010 (d) ₹ 1,015

RRB NTPC 17.01.2017 Shift-2

Ans : (c) Simple interest = $\frac{P \times R \times T}{100}$

Principal = $\frac{16000 \times 100}{8 \times 8} = ₹25000$

As per the question,

$r = \frac{1}{4}$ of 8%

Compound interest = $25000 \left(1 + \frac{8 \times \frac{1}{4}}{100} \right)^2 - 25000$
 $= \frac{25000 \times 51 \times 51}{50 \times 50} - 25000 = 26010 - 25000 = 1010$

So, Compound interest = ₹1010

63. Simple interest on a fixed sum of money is ₹1200 in 2 years at a fixed rate of interest. The compound interest of the same sum gets ₹1290 in 2 years at the rate of simple interest. What will be the Principal?

- (a) ₹1200 (b) ₹16000
(c) ₹6000 (d) ₹4000

RRB NTPC 02.04.2016 Shift : 2

Ans : (d) Rate = R, Time (T) = 2 years
 SI = ₹1200, CI = ₹1290
 Difference between CI and SI for two years

Formula: $D = P \left(\frac{R}{100} \right)^2$

$1290 - 1200 = P \left(\frac{R^2}{10000} \right)$

$PR^2 = 90 \times 10000$

$PR^2 = 900000 \dots\dots\dots (1)$

$SI = \frac{PTR}{100}$

$1200 = \frac{P \times 2 \times R}{100}$

$PR = \frac{1200 \times 100}{2}$

$PR = 60000 \dots\dots\dots (2)$

From the equation (1)–

$PR.R = 900000$

$60000 \times R = 900000$

$R = \frac{900000}{60000}$

$R = 15\%$

From the equation (2)–

$P \times 15 = ₹60,000$

$P = \frac{60000}{15}$ (Principal) $P = ₹4000$

64. A certain sum of money earns an interest of ₹2000 at a rate of 10% per annum simple interest in 2 years. If the compound interest accrues annually on this amount, what will be the effective rate of interest?

- (a) 10.25 (b) 10.50
(c) 10.75 (d) 10.15

RRB NTPC 30.03.2016 Shift : 2

Ans : (b) Let principal = ₹x

Then,

$2000 = x \times \frac{10}{100} \times 2$

$x = ₹10,000$

$CI = 10000 \left(1 + \frac{10}{100} \right)^2 - 10000$

$= 10000 \left(\frac{121}{100} - 1 \right) = ₹2100$

So, now interest rate on ₹2100

$r = \frac{2100 \times 100}{10000 \times 2} = \frac{21}{2} = 10.5\%$

Type - 5 Problems Based on The Difference Between Simple and Compound Interest

65. The difference between the compound interest and the simple interest earned on a certain sum of money in two years at 9% interest per annum is ₹97.2. Find the sum invested.

- (a) ₹15,000 (b) ₹12,500
(c) ₹10,000 (d) ₹12,000

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (d) : Let Principal = ₹ P

$CI - SI = \frac{Pr^2}{(100)^2}$

$97.2 = \frac{P \times 9 \times 9}{100 \times 100}$

$P = ₹12000$

66. The difference between the simple interest and the compound interest on ₹5000/- at 10% per annum for 3 years is:

- (a) ₹235 (b) ₹480
(c) ₹233 (d) ₹155

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (d) : The difference between simple interest and compound interest for 3 years if the rates are same,

$$d = \frac{PR^2(300+R)}{(100)^3}$$

$$d = \frac{5000 \times 100 \times 310}{100 \times 100 \times 100}$$

$$d = 5 \times 31 = 155$$

67. If the difference between the compound interest and the simple interest on a certain sum of money for 2 years at 5% per annum is ₹16.32, find the sum (in ₹)?

- (a) ₹6,526 (b) ₹6,538
(c) ₹6,528 (d) ₹6,529

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (c) : Difference between simple interest and compound interest for 2 years-

$$D = \frac{PR^2}{(100)^2}$$

$$16.32 = \frac{P \times 25}{10000}$$

$$P = ₹ 6528$$

68. If the difference between the compound interest and the simple interest on a certain sum of money of 8% p. a. for 2 years is ₹240 , then the sum of money is :

- (a) ₹37,000 (b) ₹38,500
(c) ₹38,000 (d) ₹37,500

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : The difference between C.I. and S.I.,

$$D = \frac{PR^2}{(100)^2} \text{ (for two years)}$$

$$240 = \frac{P \times 8 \times 8}{100 \times 100}$$

$$P = ₹37500$$

69. The difference between the compound interest and the simple interest on a principal sum of ₹24,000 in 2 years at same rate of interest is ₹60. The rate of interest is:

- (a) 6% (b) 7%
(c) 5% (d) 8%

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let principal = (P), Time = (t), Compound interest (CI) and simple interest (SI)

The difference between the compound interest and the simple interest for two years-

$$\text{Difference} = \text{Principal} \left(\frac{\text{Rate}}{100} \right)^2$$

$$60 = 24000 \times \frac{(\text{Rate})^2}{10000}$$

$$(\text{Rate})^2 = 5 \times 5$$

$$R = 5\%$$

70. The difference between compound interest and simple interest, at the same rate, on an amount of ₹15,000 for 2 years is ₹24. What is the rate of interest per annum?

- (a) 10% (b) 4%
(c) 6% (d) 8%

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the annual rate of interest = r% and principal be Rs. P.

Difference between compound interest and simple interest for two years

$$= P \left(\frac{r}{100} \right)^2$$

$$= P \times \frac{r}{100} \times \frac{r}{100}$$

$$= 15,000 \times \frac{r}{100} \times \frac{r}{100} = 24$$

$$r^2 = \frac{24 \times 10}{15} = 16$$

$$r = \sqrt{16} = 4\%$$

71. The difference between the compound interest compounded annually and the simple interest on a certain sum of money for 2 years at 4% per annum is ₹20.00. The sum is?

- (a) ₹ 12,500.00 (b) ₹ 10,500.00
(c) ₹ 8,500.00 (d) ₹ 11,500.00

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (a) : Rate on simple interest in two years

$$= 4\% + 4\% = 8\%$$

Rate on compound interest in two years

$$= 4\% + 4\% + \frac{4\% \times 4\%}{100} = 8.16\%$$

$$\text{Difference} = 8.16\% - 8\%$$

$$= 0.16\%$$

According to the question,

$$0.16\% = ₹20$$

$$(\text{Principal}) 100\% = \frac{20 \times 100 \times 100}{16}$$

$$= ₹12,500.00$$

72. A certain sum of money earns, simple interest of to ₹ 2,000 in two years at the rate of 10% p.a. if the interest on the same amount is compounded annually, then what will be the difference between the two types of interest?

- (a) ₹200 (b) ₹220
(c) ₹100 (d) ₹120

RRB NTPC 29.03.2016 Shift : 3

Ans : (c) Let Principal = ₹x

$$\therefore \text{Simple interest} = \frac{P \times R \times T}{100}$$

$$\Rightarrow 2000 = \frac{x \times 10 \times 2}{100}$$

$$x = ₹10000$$

$$\therefore \text{Compound interest for 2 years} = P \left[\left(1 + \frac{R}{100} \right)^T - 1 \right]$$

$$= 10000 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right]$$

$$= 10000 \left[\frac{121}{100} - 1 \right]$$

$$= 10000 \times \frac{21}{100} = ₹2100$$

$$\therefore \text{Difference between CI and SI} = 2100 - 2000 = ₹100$$

73. Find the difference between simple interest and compound interest on principal of ₹4000 at an annual rate of 20% for 2 years.

- (a) 160 (b) 120
(c) 90 (d) 110

RRB NTPC 09.04.2016 Shift : 3

Ans : (a) Principal (P) = ₹4000

Rate (R) = 20%

Difference between CI and SI for two years-

$$D = P \times \left(\frac{R}{100} \right)^2$$

$$= 4000 \times \left(\frac{20}{100} \right)^2 = 4000 \times \frac{20}{100} \times \frac{20}{100} = ₹160$$

74. The two amounts of ₹10,000 each were invested for 2 years (i) at the rate of 5% simple interest (ii) at the same rate of annual compound interest. What is the difference in their maturity value?

- (a) ₹ 30 (b) ₹ 25
(c) ₹ 20 (d) ₹ 40

RRB NTPC 26.04.2016 Shift : 1

Ans : (b)

Difference between CI and SI for two years

$$(D) = P \left(\frac{R}{100} \right)^2 = 10000 \left(\frac{5}{100} \right)^2$$

$$= 10000 \times \frac{25}{10000} = ₹ 25$$

Type - 6

Problems Based on Finding The Rate

75. A sum is invested at compounded interest payable annually. The interest in two successive years was ₹225 and ₹236.25.

- (a) 4% (b) 5.5%
(c) 4.5% (d) 5%

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (d) : From question,

Difference between two compound interest

$$= 236.25 - 225$$

$$= ₹11.25$$

Compound Interest annually = ₹11.25

$$\therefore \text{C.I.} = P \left[\left(1 + \frac{\text{Rate}}{100} \right)^t - 1 \right]$$

$$11.25 = 225 \left[\left(1 + \frac{R}{100} \right)^1 - 1 \right] \quad \left\{ \begin{array}{l} \therefore \text{Rate} = R \\ \text{Time} = 1 \text{ year} \end{array} \right.$$

$$11.25 = 225 \times \frac{R}{100}$$

$$R = 5\%$$

76. The rate of compound interest p.a. which a sum of ₹1,200 will become ₹1,348.32 in 2 years is:

- (a) 7% (b) 6%
(c) 5% (d) 8%

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given

Principal amount = ₹1,200

Amount = ₹1,348.32

Rate = R%

Time = 2 years

$$\therefore \text{Amount} = \text{Principal} \left(1 + \frac{R}{100} \right)^t$$

$$1348.32 = 1200 \left(1 + \frac{R}{100} \right)^2$$

$$\frac{1348.32}{1200} = \left(1 + \frac{R}{100} \right)^2$$

$$\frac{44944}{40,000} = \left(1 + \frac{R}{100} \right)^2$$

$$\frac{212}{200} = 1 + \frac{R}{100}$$

$$\frac{R}{100} = \frac{12}{200}$$

$$R = 6\%$$

77. At what rate of compound interest per annum will a sum of ₹1500 become ₹1591.35 in 2 years?

- (a) 3% (b) 2%
(c) 5% (d) 4%

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (a) : $A = P \left(1 + \frac{R}{100} \right)^n$

$$1591.35 = 1500 \left(\frac{100 + R}{100} \right)^2$$

$$\frac{1591.35}{1500} = \left(\frac{100 + R}{100} \right)^2$$

$$\frac{15913500}{1500} = (100 + R)^2$$

$$10609 = (100 + R)^2$$

$$100 + R = 103$$

$$R = 3\%$$

78. At what annual rate of compound interest, compounded semi-annually, will ₹57,600 become ₹72,900 in one year?

- (a) 6.25 % Annually (b) 12.5 % Annually
(c) 50 % Annually (d) 25 % Annually

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (d) : By given data—

Principal amount (P) = ₹ 57600

Amount (A) = ₹ 72900

∴ Interest, calculated semi-annually

∴ $R = R/2\%$, Time (T) = 1×2

$$\Rightarrow T = 2$$

$$\therefore A = P \left(1 + \frac{R}{100} \right)^T$$

$$\Rightarrow \frac{729}{576} = \left(1 + \frac{R}{200} \right)^2$$

$$\Rightarrow \left(\frac{27}{24} \right)^2 = \left(1 + \frac{R}{200} \right)^2$$

$$\Rightarrow \left(1 + \frac{R}{200} \right) = \frac{27}{24} \Rightarrow \frac{R}{200} = \frac{3}{24}$$

$$\Rightarrow R = 25\% \text{ Annually}$$

79. A sum of money becomes 8 times of itself in 3 years at compound interest compounded annually. The rate of interest is:

- (a) 8% (b) 100%
(c) 5% (d) Data inadequate

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let principal = ₹P

Time = 3 years

According to the question,

$$8P = P \left(1 + \frac{R}{100} \right)^3$$

$$(2)^3 = \left(1 + \frac{R}{100} \right)^3$$

$$2 = \left(1 + \frac{R}{100} \right)$$

$$2 - 1 = \frac{R}{100}$$

$$R = 100\%$$

80. A sum of money becomes ₹10648 after 3 years and ₹9680 after 2 years of compound interest compounded yearly. What is the rate of interest?

- (a) 10 % (b) 12%
(c) 8% (d) 9 %

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (a) : $A = P \left(1 + \frac{r}{100} \right)^n$

According to the question,

$$10648 = P \left(1 + \frac{r}{100} \right)^3 \dots\dots (1)$$

$$9680 = P \left(1 + \frac{r}{100} \right)^2 \dots\dots (2)$$

From equation (1) and equation (2) -

$$\frac{10648}{9680} = \frac{P \left(1 + \frac{r}{100} \right)^3}{P \left(1 + \frac{r}{100} \right)^2}$$

$$\frac{1331}{1210} = \left(1 + \frac{r}{100} \right) \Rightarrow \frac{121}{1210} = \frac{r}{100}$$

$$r = \frac{121 \times 100}{1210} = 10\%$$

81. Find the rate of interest for a sum that becomes $\frac{14641}{10000}$ time of itself in 4 years compounded annually.

- (a) 20% (b) 15%
(c) 12% (d) 10%

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let the rate of interest = R% per annum

$$\frac{14641}{10000} = \left(1 + \frac{R}{100} \right)^4$$

$$\left(\frac{11}{10} \right)^4 = \left(1 + \frac{R}{100} \right)^4$$

On comparing both sides,

$$\frac{11}{10} = 1 + \frac{R}{100}$$

$$\frac{1}{10} = \frac{R}{100}$$

$$\boxed{R = 10\%}$$

82. A sum of money amounts to ₹1600 in two years and ₹1700 in three years, at compound interest, compounded annually. What is the rate of interest.

(a) 6.5% (b) 6.25%
(c) 6% (d) 7%

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (b) : $A = P \times \left(1 + \frac{r}{100}\right)^t$

According to the question,

$$1600 = P \left(1 + \frac{r}{100}\right)^2 \quad \text{--- (i)}$$

And $1700 = P \left(1 + \frac{r}{100}\right)^3 \quad \text{--- (ii)}$

From equation (i) ÷ equation (ii),

$$\frac{1600}{1700} = \frac{P \left(1 + \frac{r}{100}\right)^2}{P \left(1 + \frac{r}{100}\right)^3}$$

$$\frac{16}{17} = \frac{1}{\left(1 + \frac{r}{100}\right)}$$

$$\frac{16}{17} = \frac{100}{100 + r}$$

$$1600 + 16r = 1700$$

$$16r = 100$$

$$r = 6.25\%$$

83. If the interest is compounded annually an amount of ₹25,000 becomes ₹36,000 after 2 years. Then find the rate of interest.

(a) 22% (b) 20%
(c) 15% (d) 5%

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (b) :

From $A = P \left(1 + \frac{r}{100}\right)^n$

$$36000 = 25000 \left(1 + \frac{r}{100}\right)^2$$

$$\Rightarrow \left(1 + \frac{r}{100}\right)^2 = \left(\frac{6}{5}\right)^2$$

$$\Rightarrow \frac{100 + r}{100} = \frac{6}{5}$$

$$\Rightarrow (100 + r)5 = 600$$

$$\Rightarrow 500 + 5r = 600$$

$$\Rightarrow 5r = 100$$

$$\boxed{r = 20\%}$$

84. At what rate of compound interest per annum will a sum of ₹10,000 become ₹11,025 in 2 years?

(a) 6% (b) 4%
(c) 4.5% (d) 5%

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (d) : Principal = ₹10000
Amount = ₹11025
Time = 2 years
Rate (R) = ?

$$A = P \left(1 + \frac{r}{100}\right)^n$$

$$11025 = 10,000 \left(1 + \frac{r}{100}\right)^2$$

$$\frac{11025}{10,000} = \left(1 + \frac{r}{100}\right)^2$$

$$\frac{441}{400} = \left(1 + \frac{r}{100}\right)^2$$

$$\left(\frac{21}{20}\right)^2 = \left(1 + \frac{r}{100}\right)^2$$

$$\frac{21}{20} = 1 + \frac{r}{100}, \quad \frac{21}{20} - 1 = \frac{r}{100}$$

$$\frac{1}{20} = \frac{r}{100} \Rightarrow 20r = 100$$

$$r = 5\%$$

85. If an investment of ₹1000 amounts to ₹1,440 in 2 years when compounded annually, then what is the rate of compound interest?

(a) 0.2% (b) 40%
(c) 30% (d) 20%

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

Principal (P) = ₹1000
Amount (A) = ₹1440
Time (t) = 2 years
Rate (R) = ?

$$\text{Amount} = P \left(1 + \frac{R}{100}\right)^t$$

$$1440 = 1000 \left(1 + \frac{R}{100}\right)^2$$

$$\left(1 + \frac{R}{100}\right)^2 = \frac{1440}{1000}$$

$$1 + \frac{R}{100} = \frac{12}{10}$$

$$\frac{100 + R}{100} = \frac{12}{10}$$

$$R = 120 - 100$$

$$\boxed{R = 20\%}$$

86. A sum of money was lent on compound interest. It became ₹500 at the end of the first year and ₹550 at the end of second year. Find the rate of compound interest per annum.

(a) 10% (b) 5%
(c) 15% (d) 20%

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : Money at the end of the first year = ₹ 500

Money at the end of the second year = ₹550

$$\begin{aligned}\% \text{ Rate} &= \frac{550-500}{500} \times 100 \\ &= 10\%\end{aligned}$$

87. A sum of money becomes ₹6,400 in 2 years and ₹8,100 in 4 years on compound interest. Find the rate of compound interest.

(a) 14.5% (b) 10.5%
(c) 16.5% (d) 12.5%

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the principal P and rate = r%

As per condition I,

Time (t) = 2 years

Amount (A₁) = ₹6400

$$A_1 = P \left(1 + \frac{r}{100} \right)^t$$

$$6400 = P \left(1 + \frac{r}{100} \right)^2 \quad \text{--- (i)}$$

As per condition II,

Time (t) = 4 years

Amount (A₂) = ₹8100

$$A_2 = P \left(1 + \frac{r}{100} \right)^t$$

$$8100 = P \left(1 + \frac{r}{100} \right)^4 \quad \text{--- (ii)}$$

On dividing equation (ii) by equation (i)–

$$\frac{8100}{6400} = \frac{P \left(1 + \frac{r}{100} \right)^4}{P \left(1 + \frac{r}{100} \right)^2}$$

$$\frac{(90)^2}{(80)^2} = \left(1 + \frac{r}{100} \right)^2$$

$$\frac{r}{100} = \frac{9}{8} - 1$$

$$r = \frac{100}{8} = 12.5\%$$

88. The production in a factory increased from 6600 tons to 7986 tons in 2 years. Find the rate of increase if compounded annually.

(a) 14% (b) 10%
(c) 12% (d) 8%

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question–

$$A = P \left(1 + \frac{R}{100} \right)^T$$

$$\frac{7986}{6600} = \left(1 + \frac{R}{100} \right)^2 \quad \left\{ \begin{array}{l} \because A = 7986 \text{ tons} \\ P = 6600 \text{ tons} \\ T = 2 \text{ years} \end{array} \right\}$$

$$\left(\frac{11}{10} \right)^2 = \left(1 + \frac{R}{100} \right)^2$$

On comparing power,

$$\frac{11}{10} - 1 = \frac{R}{100}$$

$$\frac{1}{10} = \frac{R}{100}$$

$$R = 10\%$$

89. A principal amount of ₹6,000 borrowed for compound interest is raised to ₹7,986 in 3 years. What is the rate of interest?

(a) 6% (b) 20%
(c) 7.5% (d) 10%

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (d) : Principal (P) = ₹6000

Amount (A) = ₹7986

Time (n) = 3 years

Rate (r) = ?

$$\text{Amount (A)} = \text{Principal (P)} \left(1 + \frac{r}{100} \right)^n$$

$$7986 = 6000 \left(1 + \frac{r}{100} \right)^n$$

$$\frac{7986}{6000} = \left(1 + \frac{r}{100} \right)^3$$

$$\frac{1331}{1000} = \left(1 + \frac{r}{100} \right)^3$$

$$\left(\frac{11}{10} \right)^3 = \left(1 + \frac{r}{100} \right)^3$$

$$\frac{11}{10} - 1 = \frac{r}{100}$$

$$\frac{1}{10} = \frac{r}{100}$$

$$r = 10\%$$

Type - 7

Problems Based on Finding The Time

90. An amount doubles itself at compound interest in five years. In how many years will it amount to sixteen times itself?

- (a) 25 (b) 16
(c) 20 (d) 15

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let the principal ₹x and rate of interest = R% per annum.

$$A = P \left(1 + \frac{R}{100} \right)^t$$

$$2x = x \times \left(1 + \frac{R}{100} \right)^5$$

$$2 = \left(1 + \frac{R}{100} \right)^5 \quad \dots(i)$$

Let, it become 16 times in t years-

$$16x = x \times \left(1 + \frac{R}{100} \right)^t$$

$$(2)^4 = \left(1 + \frac{R}{100} \right)^t$$

$$\left(1 + \frac{R}{100} \right)^t = \left[\left(1 + \frac{R}{100} \right)^5 \right]^4 \quad \{ \text{From eq}^n (i) \}$$

$$\left(1 + \frac{R}{100} \right)^t = \left(1 + \frac{R}{100} \right)^{20}$$

Hence, $t = 20$ years

91. In what time will ₹3,200 invested at 10% per annum compounded quarterly become ₹3,362?

- (a) $2\frac{1}{2}$ years (b) 2 years
(c) $\frac{1}{4}$ years (d) $\frac{1}{2}$ years

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (d) : Given-

Principal (P) = ₹ 3200

Amount (A) = ₹ 3362

Rate (r) = 10% per annum = $\frac{5}{2}$ quarterly

Let time = n quarterly

$$\text{Then, } A = P \left(1 + \frac{r}{100} \right)^n$$

$$3362 = 3200 \left(1 + \frac{5}{200} \right)^n$$

$$\frac{3362}{3200} = \left(1 + \frac{1}{40} \right)^n$$

$$\frac{1681}{1600} = \left(1 + \frac{1}{40} \right)^n$$

$$\left(\frac{41}{40} \right)^2 = \left(\frac{41}{40} \right)^n$$

On comparing the powers,

$n = 2$ quarterly = 6 months

$$\text{or } n = \frac{1}{2} \text{ year}$$

92. In what time will ₹1000 become ₹1331 at an interest rate of 10% annum compounded annually?

- (a) 2 years (b) 4 years
(c) $2\frac{1}{2}$ years (d) 3 years

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (d) : Principal (P) = ₹ 1000

Rate (r) = 10 %

Time (t) = ?

Amount (A) = ₹1331

$$\text{Amount (A)} = P \left(1 + \frac{r}{100} \right)^t$$

$$1331 = 1000 \left(1 + \frac{10}{100} \right)^t$$

$$\frac{1331}{1000} = \left(\frac{11}{10} \right)^t$$

$$\left(\frac{11}{10} \right)^3 = \left(\frac{11}{10} \right)^t$$

$$t = 3 \text{ years}$$

When bases are equal then their powers are also equal.

93. The compound interest on ₹20000 at 8% per annum is ₹3328. The period in years is:

- (a) 2 (b) 3
(c) 5 (d) 4

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

Principal (P) = ₹ 20,000

CI = ₹ 3328

R = 8%

t = ?

$$CI = P \left[\left(1 + \frac{R}{100} \right)^t - 1 \right]$$

$$3328 = 20000 \left[\left(1 + \frac{8}{100} \right)^t - 1 \right]$$

$$\frac{3328}{20000} = \left(1 + \frac{8}{100}\right)^t - 1$$

$$\frac{3328}{20000} + 1 = \left(1 + \frac{8}{100}\right)^t$$

$$\frac{23328}{20000} = \left(1 + \frac{8}{100}\right)^t$$

$$\frac{11664}{10000} = \left(\frac{108}{100}\right)^t$$

$$\left(\frac{108}{100}\right)^2 = \left(\frac{108}{100}\right)^t$$

$$t = 2 \text{ years}$$

94. A sum of money doubles itself at a compound interest in 15 years. In how many years will it become 8 times the original amount?

- (a) 58 years (b) 40 years
(c) 52 years (d) 45 years

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,

$$A = 2P, t = 15, \text{Rate} = R\%$$

$$\therefore A = P \left(1 + \frac{R}{100}\right)^t$$

$$2P = P \left(1 + \frac{R}{100}\right)^{15}$$

$$2 = \left(1 + \frac{R}{100}\right)^{15}$$

On cubed both sides–

$$(2)^3 = \left[\left(1 + \frac{R}{100}\right)^{15}\right]^3$$

$$8 = \left(1 + \frac{R}{100}\right)^{45}$$

On multiplying by P both sides,

$$8P = P \left(1 + \frac{R}{100}\right)^{45}$$

Hence, principal amount will become 8 times in 45 years

95. A sum of money invested at compound interest doubles itself in 12 years. In how many years will it become 4 times at the same rate of interest?

- (a) 36 (b) 24
(c) 18 (d) 20

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (b) : The amount invests at compound interest–

$$\therefore \text{Amount} = \left(1 + \frac{\text{Rate}}{100}\right)^{\text{Time}}$$

$$2P = P \left(1 + \frac{R}{100}\right)^{12}$$

$$2 = \left(1 + \frac{R}{100}\right)^{12} \dots\dots(i)$$

$$\text{And } 4P = P \left(1 + \frac{R}{100}\right)^{\text{Time}}$$

$$(2)^2 = \left(1 + \frac{R}{100}\right)^{\text{Time}}$$

By equation (i),

$$\left[\left(1 + \frac{R}{100}\right)^{12}\right]^2 = \left(1 + \frac{R}{100}\right)^{\text{Time}}$$

$$\left(1 + \frac{R}{100}\right)^{24} = \left(1 + \frac{R}{100}\right)^{\text{Time}}$$

$$\text{So, } \boxed{\text{Time} = 24 \text{ years}}$$

96. In how many years will a sum of ₹1,600 amount to ₹2,116 at 15% compound interest ?

- (a) 4 (b) 2
(c) 3 (d) 1

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given that,

Principal (P) = ₹1600, Rate (R) = 15% , Amount (A) = ₹2116

$$A = P \left(1 + \frac{R}{100}\right)^n$$

$$\frac{2116}{1600} = \left(1 + \frac{15}{100}\right)^n$$

$$\frac{529}{400} = \left(\frac{23}{20}\right)^n$$

$$\left(\frac{23}{20}\right)^2 = \left(\frac{23}{20}\right)^n$$

On comparing the powers,

$$n = 2 \text{ years}$$

97. Under a new scheme, a bank offers an interest of 30% per annum compounded annually. Suraj deposits ₹ 10,000 under this new scheme and at the end of the tenure receives ₹ 28,561. What was the tenure of the scheme that Suraj had chosen?

- (a) 2 Years (b) 3.5 Years
(c) 4 Years (d) 4.5 Years

RRB NTPC 28.04.2016 Shift : 2

Ans : (c) Given,

$$A = ₹28,561$$

$$P = ₹10,000$$

$$r = 30\%$$

$$n = ?$$

$$\therefore A = P \left(1 + \frac{r}{100} \right)^n$$

$$28561 = 10000 \left(1 + \frac{30}{100} \right)^n$$

$$\frac{28561}{10000} = \left(\frac{130}{100} \right)^n \Rightarrow \left(\frac{13}{10} \right)^n = \left(\frac{13}{10} \right)^4$$

$$\therefore n = 4 \text{ Years}$$

Type - 8 Miscellaneous

98. A certain sum at compound interest amounts to ₹3,025 in 2 years and to ₹3,327.5 in 3 years, interest compounded annually. The sum and the rate of interest p.a. are respectively :

- (a) ₹2,200 and 10% (b) ₹2,000 and 8.5%
(c) ₹2,800 and 9% (d) ₹2,500 and 10%

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (d) : Given that,

$$2 \text{ year's amount} = ₹3025$$

$$3 \text{ year's amount} = ₹3327.5$$

$$\text{Rate (R)} = \frac{3327.5 - 3025}{3025} \times 100$$

$$= 10\%$$

$$\text{Let principal} = ₹P$$

$$\text{Amount (A)} = P \left(1 + \frac{R}{100} \right)^t$$

$$3025 = P \left(1 + \frac{10}{100} \right)^2$$

$$3025 = P \times \frac{121}{100}$$

$$P = \frac{3025 \times 100}{121}$$

$$= ₹2500$$

Hence, the principal amount will be ₹2500 and the rate of interest will be 10%

99. A sum of ₹ 22,100 was divided between Timir and Monali in such a way that if both invested their shares at 10% compound interest per annum, the amount payable on maturity to Monali after 18 years would be the same as the amount payable on maturity to Timir after 20 years. What was the share of Monali in the initial sum?

(a) ₹ 12,050

(b) ₹ 12,100

(c) ₹ 12,150

(d) ₹ 12,180

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (b) :

Share of Monali = K, Time = 18 years, Rate = 10%

Share of Timir = 22100 - K, Time = 20 years,

Rate = 10%

According to the question,

$$K \left(1 + \frac{10}{100} \right)^{18} = (22100 - K) \left[\left(1 + \frac{10}{100} \right)^{20} \right]$$

$$\Rightarrow \frac{K}{22100 - K} = \frac{\left(\frac{11}{10} \right)^{20}}{\left(\frac{11}{10} \right)^{18}}$$

$$\Rightarrow \frac{K}{22100 - K} = \left(\frac{11}{10} \right)^2$$

$$\Rightarrow \frac{K}{22100 - K} = \frac{121}{100}$$

$$\Rightarrow 22100 \times 121 - 121K = 100K$$

$$\Rightarrow 221K = 22100 \times 121$$

$$\therefore \boxed{K = 12100}$$

Hence, Share of Monali = ₹12100.

100. Divide ₹20609 between A and B, such that the amount (in ₹) of A after 7 years is equal to the amount (in ₹) of B after 9 years, if the interest being compounded yearly at 3 % per annum.

(a) A = ₹10,601, B = ₹10,008

(b) A = ₹10,609, B = ₹10,000

(c) A = ₹10605, B = ₹10,004

(d) A = 10,509, B = ₹10,000

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (b) : Let A \rightarrow x

$$B \rightarrow (20609 - x)$$

According to the question,

$$x \left(1 + \frac{3}{100} \right)^7 = (20609 - x) \times \left(1 + \frac{3}{100} \right)^9$$

$$x = (20609 - x) \left(1 + \frac{3}{100} \right)^2$$

$$x = 20609 \times \frac{103}{100} \times \frac{103}{100} - \frac{103}{100} \times \frac{103}{100} \times x$$

$$\frac{(10609 + 10000)x}{10000} = 20609 \times \frac{10609}{10000}$$

$$A = x = ₹10609$$

$$B = 20609 - 10609 = ₹10000$$

Problems Based on Age

Type - 1 Problems Based on Finding The Age of a Person

1. Varun is three times as old as his sister. After six years from now the product of their ages will be 231. Find Varun's present age.

- (a) 15 years (b) 39 years
(c) 13 years (d) 5 years

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the Present age of Varun's sister = x years
And Varun's present age = $3x$ years

After 6 years,

$$\text{Varun's sister age} = (x + 6)$$

$$\text{And Varun's age} = (3x + 6)$$

According to the question-

$$(x + 6)(3x + 6) = 231$$

$$3x^2 + 6x + 18x + 36 = 231$$

$$3x^2 + 24x - 195 = 0$$

$$x^2 + 8x - 65 = 0$$

$$x^2 + 13x - 5x - 65 = 0$$

$$x(x + 13) - 5(x + 13) = 0$$

$$(x + 13)(x - 5) = 0$$

$$x = -13, 5$$

Hence, present age of Varun = $3x = 3 \times 5 = 15$ years

2. Age of A is 3 times more than that of B and half as that of C. If the sum of their ages is 120 years, what is the age (in years) of A?

- (a) 34 (b) 26
(c) 65 (d) 36

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the age of B be x years.

According to the question,

$$\text{Age of A} = 3x$$

$$\text{Age of C} = 6x$$

As per question,

$$3x + x + 6x = 120$$

$$10x = 120$$

$$x = 12 \text{ years}$$

\therefore Age of A = $3 \times 12 = 36$ years

3. Ravi is 5 years older than his wife who is 5 times as old as her daughter. Three years ago her daughter's age was 4 years. Then the present age of Ravi is -

- (a) 42 years (b) 24 years
(c) 40 years (d) 25 years

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the present age of his daughter is x years.

According to the question,

$$\text{Present age of Ravi's wife} = 5x \text{ years}$$

$$\text{Present age of Ravi} = (5x + 5) \text{ years}$$

3 years ago-

$$x - 3 = 4$$

$$x = 7 \text{ years}$$

$$\therefore \text{Present age of Ravi} = (5x + 5) = 7 \times 5 + 5 = 40 \text{ years}$$

4. The ratio of the present ages of Alok and Anil is 3 : 4. If Alok's age after 20 years from now will be 62 years, then what is Anil's present age?

- (a) 60 years (b) 64 years
(c) 52 years (d) 56 years

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the present ages of Alok and Anil be $3x$ and $4x$ respectively.

$$\text{Age of Alok after 20 years} = 3x + 20 = 62 \text{ years}$$

$$3x = 62 - 20 = 42$$

$$x = \frac{42}{3} = 14 \text{ years}$$

$$\therefore \text{Present age of Anil} = 4x = 4 \times 14 = 56 \text{ years}$$

5. Six years from now, Kirti's age will be twice the age of her brother Kunal, but 4 years ago she was four times as old as Kunal was then, Find the present age of Kunal.

- (a) 30 years (b) 9 years
(c) 24 years (d) 15 years

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (b) : Let after 6 years Kunal's age = X years

$$\text{And Kirti's age} = 2X \text{ years}$$

At present,

$$\text{Kunal's age} = (X - 6) \text{ years}$$

$$\text{And Kirti's age} = (2X - 6) \text{ years}$$

According to the question-

4 years ago-

$$(X - 10) \times 4 = 2X - 10$$

$$4X - 40 = 2X - 10$$

$$2X = 30$$

$$X = 15 \text{ years}$$

$$\text{Hence, present age of Kunal} = 15 - 6 = 9 \text{ years}$$

6. Six years later, Sunil will be twice as old as Kamal. Two years ago he was four times as old as Kamal find the present age of Kamal.

- (a) 6 years (b) 4 years
(c) 18 years (d) 14 years

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (a) : Let the present age of Kamal is x years and present age of Sunil is y years.

According to the first condition,

$$\begin{aligned} (y + 6) &= 2(x + 6) \\ \Rightarrow 2x - y &= -6 \quad \dots(i) \end{aligned}$$

According to the second condition,

$$\begin{aligned} (y - 2) &= (x - 2) \times 4 \\ \Rightarrow 4x - y &= 6 \quad \dots(ii) \end{aligned}$$

From equation (ii) and equation (i),

$$\begin{aligned} 2x &= 12 \\ \Rightarrow x &= 6 \end{aligned}$$

Hence, present age of Kamal = 6 years

7. A is 6 years older than B. 10 years ago, B's age was three quarters of A's age. Find the present age (in years) of A.

- (a) 34 (b) 28
(c) 38 (d) 24

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let B's age = x years

And age of A = $(x+6)$ years

Before 10 years,

Age of B = $(x-10)$ years

Age of A = $[(x+6)-10]$ years

According to the question,

$$(x - 10) = [(x + 6) - 10] \times \frac{3}{4}$$

$$x - 10 = (x - 4) \times \frac{3}{4}$$

$$x - 10 = \frac{3}{4}x - 3$$

$$x - \frac{3}{4}x = 7$$

$$x = 28 \text{ years}$$

So, the present age of A = $28 + 6 = 34$ years

8. The ratio of ages of Keshav and Vipul is 9:10. After 12 years the ratio of the age will be 13 : 14. Find out the present age of Keshav?

- (a) 27 years (b) 30 years
(c) 42 years (d) 39 years

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (a) : Let the present age of Keshav is $9x$ and the present age of Vipul is $10x$.

According to the question,

$$\begin{aligned} \frac{9x + 12}{10x + 12} &= \frac{13}{14} \\ 126x + 168 &= 130x + 156 \\ 4x &= 12 \\ x &= 3 \end{aligned}$$

Hence, the present age of Keshav = $9x = 9 \times 3 = 27$ years.

9. A son is 24 years younger than his father, and in 2 years, he will be half of the age of his father. What is the age of the father?

- (a) 46 (b) 48
(c) 50 (d) 44

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let the age of his father = y years

And age of son = x years

According to the question,

$$x = y - 24 \quad \dots(i)$$

After 2 years-

$$y + 2 = 2(x + 2)$$

$$y + 2 = 2(y - 24 + 2) \quad \{\because \text{By equation (i)}\}$$

$$y + 2 = 2y - 44$$

$$2y - y = 44 + 2$$

$$y = 46$$

So, age of his father = 46 years

10. 10 years ago, the average age of a husband and his wife was 42 years. Now, the average age of the family consisting of the husband, wife and their son is 39 years. The present age of the son is:

- (a) 20 years (b) 13 years
(c) 10 years (d) 15 years

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (b) : 10 years ago, the sum of ages of husband and wife = $42 \times 2 = 84$

$$\begin{aligned} \text{Sum of age of husband \& wife in present} \\ &= 84 + 20 = 104 \end{aligned}$$

$$\begin{aligned} \text{Sum of age of husband, wife and son in present} \\ &= 39 \times 3 = 117 \end{aligned}$$

$$\therefore \text{Present age of son} = 117 - 104 - 13 \text{ years.}$$

11. Lima's father is four times as old as Lima. Four years ago, his father was six times as old as he was then. Find the present age of his father

- (a) 45 years (b) 30 years
(c) 35 years (d) 40 years

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the Lima's present age = x years

Present age of father = $4x$ years

4 years ago-

$$(4x - 4) = (x - 4) \times 6$$

$$4x - 4 = 6x - 24$$

$$2x = 20$$

$$x = 10$$

$$\therefore \text{Present age of his father} = 4x$$

$$= 4 \times 10 = 40 \text{ years}$$

12. The present ages of Maya and Meera are in the ratio of 6 : 5 and after fifteen years the ratio will be 9 : 8. Meera's age is:

- (a) 30 years (b) 35 years
(c) 20 years (d) 25 years

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let present age of Maya = $6x$ years

And present age of Meera = $5x$ years

According to the question,

$$\frac{6x + 15}{5x + 15} = \frac{9}{8}$$

$$48x + 120 = 45x + 135$$

$$3x = 15$$

$$x = 5$$

So, the present age of Meera = $5 \times 5 = 25$ years

13. The ages of Mahendra and Zahid are in the ratio 6 : 7. Fifteen years ago their ages were in the ratio 9 : 11. Mahendra's present age is :
- (a) 10 years (b) 60 years
(c) 54 years (d) 18 years

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the present age of Mahendra and Zahid be $6x$ and $7x$ respectively.

According to the question,

$$\frac{6x-15}{7x-15} = \frac{9}{11}$$

$$66x-165 = 63x-135$$

$$3x = 30$$

$$x = 10$$

So, the present age of Mahendra = $6 \times 10 = 60$ years

14. When the age of father is 54 years then the difference between the ages of the two sisters is 4 years. Father is two years older than mother. The age of the younger sister is half of the age of the mother. Find the age of the elder sister.
- (a) 26 (b) 27
(c) 29 (d) 30

RRB NTPC 06.04.2016 Shift : 1

Ans : (d) Age of father = 54 years

\therefore Age of mother = $54 - 2 = 52$ years

Age of younger sister = $\frac{\text{Age of mother}}{2} = \frac{52}{2} = 26$ years

Age of elder sister - Age of younger sister = 4 years

Age of elder sister - 26 = 4 years

\therefore Age of elder sister = $4 + 26 = 30$ years

15. Sarika has three children. First is 5 years older than the second one and the second one is 4 years older than the third. The sum of their ages is 22 years. Find the age of the eldest child.
- (a) 7 (b) 9 (c) 11 (d) 12

RRB NTPC 29.04.2016 Shift : 1

Ans : (d) Let the age of second child = x years

Then the age of third child = $(x - 4)$ years

And the age of first child = $(x + 5)$ years

According to the question,

$$x - 4 + x + x + 5 = 22$$

$$3x + 1 = 22$$

$$3x = 21$$

$$x = 7$$

\therefore Age of the eldest child = $x + 5 = 7 + 5 = 12$ years

16. A man is 24 years older than his son. After four years, his age will be twice of his son's age. What is the present age of father?
- (a) 40 years (b) 44 years
(c) 42 years (d) 48 years

RRB NTPC 04.04.2016 Shift : 3

Ans : (b) Let the present age of father = x years

\therefore Present age of son = $(x - 24)$ years

Age of father after 4 years = $(x + 4)$ years

And age of son after 4 years = $(x - 20)$ years

According to the question,

$$x + 4 = 2 \times (x - 20)$$

$$x + 4 = 2x - 40$$

$$2x - x = 4 + 40 \Rightarrow x = 44$$

Therefore, present age of father is 44 years.

17. The sum of the ages of 4 children born at an intervals of 4 years is 48. Find the age of the youngest child.
- (a) 4 years (b) 5 years
(c) 6 years (d) 7 years

RRB NTPC 05.04.2016 Shift : 3

Ans : (c) Let the age of youngest child be x .

According to the question,

$$\therefore x + x + 4 + x + 8 + x + 12 = 48 \text{ years}$$

$$4x + 24 = 48 \text{ years}$$

$$4x = 24 \Rightarrow x = 6 \text{ years}$$

\therefore Age of the youngest child is = 6 years

18. After five years, Mayank age will be $\frac{3}{5}$ th of his father's age. Five years ago the ratio of their age was 2:5. Find the present age of Mayank.
- (a) 17 (b) 13
(c) 19 (d) 15

RRB NTPC 19.04.2016 Shift : 3

Ans : (b) Let 5 years ago Mayank's age is $2x$ years and father's age is $5x$ years.

Then after 5 years,

$$\frac{\text{Age of Mayank}}{\text{Age of father}} = \frac{3}{5}$$

$$\frac{2x+5+5}{5x+5+5} = \frac{3}{5}$$

$$10x + 50 = 15x + 30$$

$$5x = 20$$

$$x = 4$$

Therefore, present age of Mayank = $2x + 5$

$$= 2 \times 4 + 5 = 13 \text{ years}$$

19. 6 years ago a man's age was 5 times of his son's age. After 10 years, he will be 3 times of his son. What is his son's present age?
- (a) 20 (b) 18
(c) 24 (d) 22

RRB NTPC 18.04.2016 Shift : 3

Ans : (d) Let the present age of father and son be x and y respectively.

According to the question -

$$x - 6 = 5(y - 6) \Rightarrow x - 5y = -24 \quad \dots (i)$$

And

$$x + 10 = 3(y + 10) \Rightarrow x - 3y = 20 \quad \dots (ii)$$

From equation (i) and (ii) -

$$x = 86, y = 22$$

Therefore, Present age of son is 22 years.

20. The product of Sapna and Anubha's age is 150. If 4 times the age of Anubha is 10 years more than the age of Sapna. Find the age of Sapna.

(a) 20 (b) 27
(c) 19 (d) 17

RRB NTPC 22.04.2016 Shift : 1

Ans : (a) Let the age of Sapna = x years
Age of Anubha = y years
According to the question,
 $xy = 150$ (i)
 $4y = x + 10$ (ii)
From equation (i), $y = \frac{150}{x}$
On putting the value of y in equation (ii),
 $4 \times \frac{150}{x} = x + 10$
 $600 = x^2 + 10x$
 $x^2 + 10x - 600 = 0$
 $x^2 + 30x - 20x - 600 = 0$
 $x(x + 30) - 20(x + 30) = 0$
 $(x + 30)(x - 20) = 0$
 $x + 30 = 0$
 $x = -30$ (Invalid)
 $x - 20 = 0$
 $x = 20$
Therefore, age of Sapna is 20 years.

21. The product of the age of Swati and Aparna is 120. If thrice the age of Aparna is 2 years more than Swati's age, then find the age of Swati?

(a) 18 (b) 20
(c) 24 (d) 16

RRB NTPC 18.04.2016 Shift : 1

Ans : (a) Let the age of Swati is x years and age of Aparna is y years.
According to first condition—
 $xy = 120$ (i)
According to second condition—
 $3y = x + 2$
 $y = \left(\frac{x+2}{3}\right)$
On putting the value of y in equation (i)—
 $x \times \left(\frac{x+2}{3}\right) = 120$
 $x^2 + 2x - 360 = 0$
 $x^2 + 20x - 18x - 360 = 0$
 $x(x + 20) - 18(x + 20) = 0$
 $(x + 20)(x - 18) = 0$
 $x + 20 = 0$ or $x - 18 = 0$
 $x = -20$ (Invalid) or $x = 18$
Therefore, age of Swati = 18 years

Type - 2

Problems Based on Finding The Age of Two Persons

22. At present, Ram is 4 times of his son's age. After 5 years he will be 3 times the age of his son. Find their present age?

(a) 60,15 (b) 40,10
(c) 20,5 (d) 32,8

RRB NTPC 28.03.2016 Shift : 1

Ans : (b) Let the present age of Ram's son = x years
Present age of Ram = $4x$ years
According to the question,
 $4x + 5 = 3(x + 5)$
 $\Rightarrow 4x + 5 = 3x + 15 \Rightarrow x = 10$
 \therefore Present age of Ram = $4 \times 10 = 40$ years
Therefore, present age of Ram and his son is 40 years and 10 years respectively.

23. John is twice as old as Jean. After 3 years, the sum of their ages will be 66 years. What are the present ages of Jean and John respectively?

(a) 20 and 40 years (b) 24 and 48 years
(c) 40 and 20 years (d) 42 and 84 years

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let present age of Jean = x years
Present age of John = $2x$ years
After 3 years—
Age of Jean = $(x + 3)$ years
Age of John = $(2x + 3)$ years
Sum of their ages = 66 years
 $x + 3 + 2x + 3 = 66$
 $3x + 6 = 66$
 $x = 20$ years
 \therefore Present age of Jean = 20 years
Present age of John = $2x = 20 \times 2 = 40$ years

24. The ages of A and B are in the ratio 3:1. Fifteen years hence, the ratio will be 2:1. Their present ages are respectively:

(a) 30 years, 10 years (b) 21 years, 7 years
(c) 60 years, 20 years (d) 45 years, 15 years

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (d) : Let, the present ages of A & B is $3x$ and x respectively.
According to the question,
 $\frac{3x+15}{x+15} = \frac{2}{1}$
 $3x + 15 = 2x + 30$
 $x = 15$
 \therefore Present age of A = $3x = 3 \times 15 = 45$ years
Present age of B = $x = 15$ years

25. Narendra's mother is four times as old as Narendra. Four years ago, his mother was six times as old as Narendra was. What are their present ages?

(a) 7 years, 28 years (b) 10 years, 40 years
(c) 5 years, 20 years (d) 20 years, 80 years

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let Narendra's present age = x years
And mother's present age = $4x$ years.

4 year ago,

Narendra's age = $(x - 4)$ years

Mother's age = $(4x - 4)$ years

According to the question:-

$$6 \times (x - 4) = (4x - 4)$$

$$6x - 24 = 4x - 4$$

$$2x = 20$$

$$x = 10$$

Hence, Narendra's present age is 10 years and mother's present age is 40 years.

26. The ratio of present ages of Ram and Shyam is 7:8. After nine years this ratio will be 8:9. What is the present ages of Ram and Shyam (in years respectively)?

- (a) 64, 73 (b) 63, 72
(c) 72, 63 (d) 73, 64

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (b) : Let the present ages of Ram and Shyam be $7x$ and $8x$ respectively.

According to the question-

$$\frac{7x+9}{8x+9} = \frac{8}{9}$$

$$64x+72=63x+81$$

$$x=9$$

Hence, the present age of Ram = $7 \times 9 = 63$ years

and present age of shyam = $8 \times 9 = 72$ years

27. The ratio of age of two brothers is 5:8 and the difference of their age is 12 years, find their age.

- (a) 20, 32 (b) 16, 28
(c) 18, 30 (d) 22, 34

RRB NTPC 31.03.2016 Shift : 3

Ans : (a) Let the age of both brothers be $5x$ and $8x$ years respectively.

From question-

$$8x - 5x = 12$$

$$3x = 12 \Rightarrow x = 4$$

Hence, the age of both brothers is 20 years and 32 years respectively.

28. The difference in ages of Sunita and Sheela is 12 years. If 9 years ago the elder's age was 4 times than that of younger's age, then what is their present age?

- (a) 11 and 23 (b) 15 and 27
(c) 13 and 25 (d) 23 and 35

RRB NTPC 18.04.2016 Shift : 2

Ans : (c) Let the present age of Sunita be x years

Present age of Sheela = $(x - 12)$ years

According to the question,

$$x - 9 = 4(x - 12 - 9)$$

$$x - 9 = 4(x - 21)$$

$$x - 9 = 4x - 84$$

$$4x - x = 84 - 9$$

$$3x = 75$$

$$x = 25$$

\therefore Present age of Sunita = $x = 25$ years

Present age of Sheela = $x - 12 = 25 - 12 = 13$ years

Type - 3

Problems Based on Finding The Sum and Difference of Ages

29. The sum of the present ages of Aditi, Aditya and Aadya is 120 years. What was the sum of their ages 3 years ago?

- (a) 111 (b) 114
(c) 112 (d) 118

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question-

Sum of present ages of Aditi, Aditya and Aadya = 120 years

$$3 \text{ years ago sum of their ages} = 120 - 3 \times 3$$

$$= 120 - 9$$

$$= 111 \text{ years}$$

30. Aman's great-grandfather age is 105 years old. Aman's father Ram Singh's age is $\frac{1}{3}$ of his grand father. Five years ago, when Aman was born, Ram Singh's mother was double the age of Ram Singh. What is the difference of age between Aman and Ram Singh?

- (a) 25 years (b) 30 years
(c) 20 years (d) 35 years

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (b) : Aman's great grandfather age = 105 years

$$\text{Aman's father Ram Singh's age} = \frac{105}{3} = 35 \text{ years}$$

$$\text{Age of Ram singh five year ago} = 35 - 5 = 30$$

$$\text{Ram Singh's mother age when Aman was born}$$

$$= 30 \times 2 = 60 \text{ years}$$

$$\text{Present age of Aman} = 5 \text{ years}$$

$$\text{Present age of his father Ram Singh} = 35 \text{ years}$$

$$\therefore \text{Required difference} = 35 - 5 = 30 \text{ years}$$

31. A father's age is twice the age of his son, twenty years ago, the age of the father was 12 times that of his son then find the difference (in years) of the present ages of father and son.

- (a) 44 (b) 12
(c) 2 (d) 22

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : Let the present age of son be x years

Then the present age of the father = $2x$ years

According to the question-

$$2x - 20 = 12(x - 20)$$

$$2x - 20 = 12x - 240$$

$$10x = 220$$

$$x = 22$$

$$\therefore \text{Present age of son} = x = 22 \text{ years}$$

$$\text{And present age of father} = 2x = 2 \times 22 = 44 \text{ years}$$

$$\therefore \text{Required difference} = 44 - 22 = 22 \text{ years}$$

32. Four years ago, the ratio of the age of Ram to that of Shyam was 13 : 9. Eight years from now, their ages will be in the ratio 4 : 3. The difference (in years) between their present ages is:

- (a) 18 (b) 17
(c) 19 (d) 16

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (d) : Let four years ago, the age of Ram and Shyam be $13x$ and $9x$ years respectively.

According to the question,

$$\frac{13x+4+8}{9x+4+8} = \frac{4}{3}$$

$$\frac{13x+12}{9x+12} = \frac{4}{3}$$

$$39x+36 = 36x+48$$

$$3x = 48 - 36$$

$$x = \frac{12}{3}$$

$$x = 4$$

$$\begin{aligned} \text{Difference of their present ages} &= (13x+4) - (9x+4) \\ &= 4x = 4 \times 4 = 16 \text{ years} \end{aligned}$$

33. The age of A and B are in the ratio of 5 : 3. After 5 years the ratio of their ages will be 10 : 7. What is the difference between present ages of A and B (in years)?

- (a) 5 (b) 6
(c) 4 (d) 3

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the present age of A and B be $5x$ and $3x$ respectively.

As per question,

$$\frac{5x+5}{3x+5} = \frac{10}{7}$$

$$35x+35 = 30x+50$$

$$5x = 15$$

$$x = 3$$

$$\text{Present age of A} = 5x = 5 \times 3 = 15$$

$$\text{Present age of B} = 3x = 3 \times 3 = 9$$

$$\therefore \text{Difference between present ages of A and B} = 15 - 9 = 6 \text{ years}$$

34. The ratio of the present ages of X and Y is 2:1. After 14 years the ratio of their ages ratio will be 29:18. What is the difference between the present age of X and Y.

- (a) 22 years (b) 11 years
(c) 9 years (d) 13 years

RRB NTPC 19.04.2016 Shift : 3

Ans : (a) Let the present age of X and Y be $2x$ and x respectively.

According to the question,

$$\frac{2x+14}{x+14} = \frac{29}{18}$$

$$36x+252 = 29x+406$$

$$7x = 154$$

$$x = 22$$

$$\begin{aligned} \therefore \text{Difference between the present age of X and Y} \\ = 2x - x = x = 22 \text{ years} \end{aligned}$$

Type - 4

Problems Based on The Ratio of Ages

35. Ten years ago, X was 5 years old and his age was half of the age of Y. At that time, Z was 8 years younger than his brother P. Z was 18 years old at that time. What is the ratio of the respective ages of Z and P at present?

- (a) 14 : 19 (b) 4 : 5
(c) 7 : 9 (d) 9 : 7

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (c) : Before 10 years,

Age of X = 5 years

Age of Y = 10 years

Age of Z = 18 years

Age of P = 26 years

Present age

$$\text{Age of Z} = 18 + 10 = 28$$

$$\text{Age of P} = 26 + 10 = 36$$

$$\therefore \text{Required ratio} = 28 : 36 = 7 : 9$$

36. The ratio of the age of Naresh and Suresh is 6 : 5 and the sum of their ages is 44 years. The ratio of their respective ages after 15 years will be:

- (a) 34 : 39 (b) 39 : 34
(c) 39 : 35 (d) 30 : 35

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (c) : Let the age of Naresh and Suresh be $6x$ and $5x$.

According to the question-

$$6x + 5x = 44$$

$$11x = 44$$

$$x = 4$$

The ratio of their ages after 15 years

$$= \frac{6x+15}{5x+15} = \frac{6 \times 4 + 15}{5 \times 4 + 15} = \frac{39}{35} = 39 : 35$$

37. The age ratio of Jay and Jog is 5:2. The sum of their age is 63. What will be the ratio of their ages after 9 years?

- (a) 5:2 (b) 2:1
(c) 3:2 (d) 4:3

RRB NTPC 03.04.2016 Shift : 1

Ans : (b) Let the present age of Jay and Jog be $5x$ and $2x$ years respectively.

According to the question,

$$5x + 2x = 63$$

$$7x = 63$$

$$x = 9$$

$$\begin{aligned} \therefore \text{Ratio of their ages after 9 years} &= (5 \times 9 + 9) : (2 \times 9 + 9) \\ &= 54 : 27 \\ &= 2 : 1 \end{aligned}$$

38. The ratio of the present ages of Seema and Reema is 2:3. Seema is 6 years younger than Reema. After 6 years the age ratio of the ages of Seema and Reema will be:

- (a) 2:3 (b) 2:7
(c) 3:4 (d) 7:8

RRB NTPC 22.04.2016 Shift : 1

Ans : (c)

Let the present age of Seema and Reema be $2x$ and $3x$ years respectively.

According to the question,

$$3x - 2x = 6$$

$$x = 6$$

Present age of Seema and Reema = $2 \times 6, 6 \times 3$

$$= 12 \text{ years, } 18 \text{ years}$$

Ratio of the ages of Seema and Reema after 6 years–

$$= (12+6) : (18+6)$$

$$= 18 : 24 = 3 : 4$$

39. In a school, the average age of boys and girls together is 16.8 years, the average age of boys is 15.4 years, and the average age of girls is 18.2 years. The ratio of number of boys to girls in the school is:

(a) 3 : 2 (b) 1 : 1 (c) 3 : 5 (d) 2 : 3

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) : Let the number of girls be x

Number of boys = y

According to the question,

$$(x+y) \times 16.8 = y \times 15.4 + x \times 18.2$$

$$16.8x + 16.8y = 15.4y + 18.2x$$

$$16.8y - 15.4y = 18.2x - 16.8x$$

$$1.4y = 1.4x$$

$$\therefore \text{Required ratio } \frac{y}{x} = \frac{1}{1} = 1 : 1$$

Type - 5 Miscellaneous

40. In a school $\frac{5}{8}$ of the number of students are girls and the rest are boys. $\frac{2}{5}$ of the number of girls are below 12 years of age and $\frac{4}{9}$ of the boys are 12 years of age or above. If the total number of students is 288, how many students are below 12 years of age?

(a) 132 (b) 124 (c) 144 (d) 140

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (a) : Given,

Total number of students = 288

$$\text{Number of girls} = 288 \times \frac{5}{8} = 180$$

$$\text{Number of boys} = 288 - 180 = 108$$

$$\text{Number of girls below 12 years} = 180 \times \frac{2}{5} = 72$$

$$\begin{aligned} \text{Number of boys below 12 years} &= 108 \times \left(1 - \frac{4}{9}\right) \\ &= 108 \times \frac{5}{9} \\ &= 60 \end{aligned}$$

$$\begin{aligned} \text{Hence, Number of students below 12 years} &= 72 + 60 \\ &= 132 \end{aligned}$$

41. After 2 years from today a man's age will be four times that of his son and after 4 years that the man's age will be 3 times of his son's age. After how many years will the father's age be twice of his son?

(a) 15 years (b) 16 years
(c) 17 years (d) 18 years

RRB NTPC 10.04.2016 Shift : 3

Ans : (d) Let the age of man be x years

And age of son = y years

From question,

$$(x+2) = (y+2) \times 4$$

$$x+2 = 4y+8$$

$$x = 4y+6 \quad \dots\dots\dots(i)$$

Again

$$(x+6) = (y+6) \times 3$$

$$x+6 = 3y+18$$

$$x = 3y+12 \quad \dots\dots\dots(ii)$$

From equation (i) and (ii),

$$4y+6 = 3y+12$$

$$y = 6 \text{ years}$$

On putting the value of y in equation (i),

$$x = 4 \times 6 + 6$$

$$x = 30 \text{ years}$$

Now, let after A years, father's age will be 2 times that of his son.

$$\therefore (30+A) = (6+A) \times 2$$

$$30+A = 12+2A$$

$$\therefore A = 18 \text{ years}$$

42. If $\frac{2}{3}$ children are in the age group of 1-12, $\frac{1}{2}$ children are in the age group of 1-8. Then find the part of children in the age group of 9-12?

(a) $\frac{1}{3}$ (b) $\frac{1}{4}$
(c) $\frac{1}{6}$ (d) $\frac{1}{2}$

RRB NTPC 28.03.2016 Shift : 1

Ans : (c) : Children in age group (9 – 12)

= Children in age group (1-12) years – Children in age group (1-8) years.

$$= \frac{2}{3} - \frac{1}{2} = \frac{4-3}{6} = \frac{1}{6}$$

43. If the average age of A, B and C is 22 years and the average age of B and C is 25 years, then find A's age after 9 years.

(a) 50 years (b) 35 years
(c) 45 years (d) 25 years

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (d) : Sum of age of A, B and C = $22 \times 3 = 66$ years

Sum of age of B and C = $25 \times 2 = 50$ years

Age of A = $66 - 50 = 16$ years

\therefore Age of A after 9 years = $16 + 9 = 25$ years

44. The present age of Z is half of A's age. After 5 years the ratio of ages of A and Z will be 11:6. After 3 years what will be the age of Z?

(a) 25 (b) 30
(c) 28 (d) 22

RRB NTPC 31.03.2016 Shift : 1

Ans : (c) Let the present age of Z and A be x and $2x$ years.

According to the question,

$$\frac{2x+5}{x+5} = \frac{11}{6}$$

$$12x+30 = 11x+55$$

$$x = 25$$

$$\therefore \text{Age of Z after 3 years} = x + 3 = 28 \text{ years}$$

Type - 1

Problems Based on The Average of Consecutive Numbers

1. Consider a sequence of seven consecutive numbers. If the average of the first five numbers is 'z', then find the average of the last three numbers.

- (a) $z + 3$ (b) $z + 5$
(c) $z + 1$ (d) $z + 7$

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (a) : Seven consecutive numbers 1, 2, 3, 4, 5, 6, 7
According to the question,

$$\text{Average of the first five numbers (z)} = \frac{1+2+3+4+5}{5}$$

$$z = \frac{15}{5} = 3$$

Then, $z = 3$

$$\begin{aligned} \text{Hence, Average of the last three numbers} &= \frac{5+6+7}{3} \\ &= \frac{18}{3} = 6 \text{ or } z + 3 \end{aligned}$$

2. The average of 3 consecutive natural numbers (which are in increasing order) is K. If two more consecutive numbers, just next to the first set of numbers, are added then the new average will become.

- (a) $\frac{2K+1}{2}$ (b) $K+1$
(c) $K+2$ (d) $2K-1$

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (b) : Let,

First natural number = x

Second natural number = $x+1$

Third natural number = $x+2$

$$\text{Average} = \frac{x+(x+1)+(x+2)}{3} = \frac{3x+3}{3} = \frac{3(x+1)}{3} = x+1$$

Average of the first 3 consecutive natural numbers

$$\boxed{x+1=K} \quad \dots\dots(i)$$

Average of 5 consecutive natural numbers

$$\frac{x+(x+1)+(x+2)+(x+3)+(x+4)}{5} = \frac{5x+10}{5} = \frac{5(x+2)}{5}$$

$$= x+2 = x+1+1$$

From equation (i)

$$x+1+1 = K+1 \quad (\because x+1=K)$$

3. Find the average of first 20 multiples of 7

- (a) 66.5 (b) 67.5
(c) 73.5 (d) 74.5

RRB NTPC 03.04.2016 Shift : 3

Ans : (c) Sum of the first n multiples of K

$$= \frac{K[n(n+1)]}{2}$$

$$\text{Sum of the first 20 multiples of 7} = \frac{7 \times [20(20+1)]}{2}$$

$$\begin{aligned} &= \frac{7 \times 20 \times 21}{2} \\ &= 1470 \end{aligned}$$

$$\text{Average} = \frac{\text{Sum of all observation}}{\text{Total number of observation}}$$

$$\text{Average} = \frac{1470}{20}$$

$$\text{Average} = 73.5$$

4. Find the average of first 20 multiples of 8–

- (a) 78 (b) 80
(c) 84 (d) 82

RRB NTPC 02.04.2016 Shift : 1

Ans : (c) 8, 16, 24 160

$$\text{Sum of terms} = \frac{n}{2}(a + \ell)$$

$$= \frac{20}{2}(8+160) = 10 \times 168 = 1680$$

$$\therefore \text{Average} = \frac{1680}{20} = 84$$

5. What is the average of first 30 multiples of 9?

- (a) 142 (b) 138.5
(c) 139.5 (d) 143.5

RRB NTPC 16.04.2016 Shift : 1

Ans : (c) Sum of the first n multiples of K

$$= \frac{K[n(n+1)]}{2}$$

$$\therefore \text{Sum of the first 30 multiples of 9} = \frac{9[30(30+1)]}{2}$$

$$= \frac{9 \times 30 \times 31}{2}$$

$$= 4185$$

$$\therefore \text{Average} = \frac{4185}{30} = 139.5$$

6. The average of 5 consecutive numbers is 50. What is the difference between the product of the largest and smallest number to the product of the fourth and second number?

(a) 3 (b) -3
(c) 0 (d) 10

RRB NTPC 27.04.2016 Shift : 1

Ans : (b) Let the five consecutive numbers are $x, x + 1, x + 2, x + 3$ and $x + 4$

$$\therefore \frac{x + (x + 1) + (x + 2) + (x + 3) + (x + 4)}{5} = 50$$

$$5x + 10 = 250$$

$$5x = 240$$

$$x = 48$$

\therefore From question,

$$\begin{aligned} & x(x + 4) - (x + 1)(x + 3) \\ &= x^2 + 4x - (x^2 + 4x + 3) = -3 \end{aligned}$$

7. The average of 5 consecutive numbers is 10 then what will be the middle number?

(a) 10 (b) 11
(c) 8 (d) 9

RRB NTPC 29.04.2016 Shift : 3

Ans. (a) : Let the five consecutive numbers are $x, x + 1, x + 2, x + 3$ and $x + 4$

Total sum -

$$x + (x + 1) + (x + 2) + (x + 3) + (x + 4) = 10 \times 5$$

$$5x + 10 = 50$$

$$5x = 40$$

$$x = 8$$

\therefore Hence, the middle number = $(x + 2) = 8 + 2 = 10$

8. The average of 5 consecutive numbers is 100, find the first number.

(a) 98 (b) 99
(c) 100 (d) 101

RRB NTPC 30.04.2016 Shift : 1

Ans : (a) Let the five consecutive numbers are

$$x, x + 1, x + 2, x + 3 \text{ and } x + 4$$

$$\therefore \frac{x + x + 1 + x + 2 + x + 3 + x + 4}{5} = 100$$

$$5x + 10 = 500$$

$$5x = 490$$

$$x = 98$$

Therefore, the first number is 98.

9. The average of 5 consecutive numbers is 100, then the difference of the squares of the largest and the smallest number will be:

(a) 800 (b) 990 (c) 900 (d) 1000

RRB NTPC 30.04.2016 Shift : 2

Ans : (a) Let the five consecutive numbers are $x, x + 1, x + 2, x + 3$ and $x + 4$ respectively

According to the question,

$$\frac{x + x + 1 + x + 2 + x + 3 + x + 4}{5} = 100$$

$$\frac{5x + 10}{5} = 100$$

$$5x + 10 = 500$$

$$5x = 490$$

$$x = 98$$

$$\text{Largest number} = x + 4 = 98 + 4 = 102$$

$$\text{Smallest number} = x = 98$$

Therefore, difference between square of the largest and the smallest numbers

$$= (102)^2 - (98)^2 = (102 + 98)(102 - 98) = 200 \times 4 = 800$$

Type - 2

Problems Based on Examination, Students and Marks

10. The average score of class A of 40 students in the mathematics test of 30 marks is 23. The average score of class B of 45 students in the same test is 22. What is the ratio of the average score of both the classes to that of class A?

(a) 380 : 391 (b) 390 : 382
(c) 382 : 391 (d) 391 : 382

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (c) : The ratio of the average score of both the classes to that of class A.

$$\text{Ratio} = \frac{40 \times 23 + 45 \times 22}{40 + 45} : 23$$

$$= \frac{5(8 \times 23 + 9 \times 22)}{85} : 23$$

$$= \frac{(184 + 198)}{17} : 23$$

$$= 382 : 23 \times 17 = 382 : 391$$

11. The average of five students in a class test is 39.20 and the average of three of them is 41. What is the average of the remaining two students?

(a) 37.5 (b) 36.5
(c) 39.5 (d) 38.5

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (b) : Average of marks obtained by 5 students = 39.2 (Sum = Average \times No. of students)
 \therefore Sum of marks obtained by 5 students = $39.2 \times 5 = 196$
 Sum of marks obtained by 3 students = $41 \times 3 = 123$
 Average of the remaining two students = $\frac{196-123}{2} = 36.5$

- 12. In a class of 100 students, the average marks obtained in a certain subject is 25 and in another class of 50 students, the average marks obtained in the same subject is 70. The average marks obtained by the students of both the classes taken together.**

- (a) 25 (b) 60
 (c) 30 (d) 40

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : Total marks obtained by the class of 100 students
 $= 100 \times 25 = 2500$
 Total marks obtained by the class of 50 students = $50 \times 70 = 3500$
 Hence, the average of the total marks obtained by the students of both the classes = $\frac{\text{Total marks obtained}}{\text{Total number of students}}$
 $= \frac{2500 + 3500}{100 + 50} = \frac{6000}{150} = 40$

- 13. The average marks obtained by a group of 25 students was 36. One student left the group, as a result of which the average of the remaining students grow to 37.5. Soon after another joined the same group, as a result of which the average marks dropped to 37.2. Find the average marks of the student who left and the student who joined the group.**

- (a) 37.5 (b) 22.5
 (c) 30 (d) 15

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (d) :
 Total marks obtained by 25 students = $25 \times 36 = 900$
 Total marks obtained by 24 students = $24 \times 37.5 = 900$
 So marks obtained by the student who left the group = $900 - 900 = 0$
 Marks obtained by (24 students + 1 new joined student) = $25 \times 37.2 = 930$
 Marks obtained by the new student who joined the group = $930 - 900 = 30$ marks
 Hence, average of marks obtained by the students who left and the one who joined = $\frac{0+30}{2} = 15$ marks

- 14. The average of the marks scored by 40 students is 68. Later on, it was found that a score of 25 was misread as 45. Find the correct average :**

- (a) 68.5 (b) 28
 (c) 15 (d) 67.5

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (d) : Increased marks by mistake = $25 \sim 45 = 20$

$$\text{Increased Average} = \frac{20}{40} = 0.5$$

$$\text{Correct average} = 68 - 0.5 = 67.5$$

- 15. In a class the average marks obtained by 35 students is 63. If two more students whose average is 85.5 is add, to these then the new average of the class is?**

- (a) 64.20 (b) 67.90
 (c) 63.62 (d) 65.35

RRB NTPC 04.04.2016 Shift : 2

Ans : (a) Total sum of marks of 35 students
 $= 35 \times 63 = 2205$

From question-

$$\begin{aligned} \text{New average of the class} &= \frac{2205 + 2 \times 85.5}{35 + 2} \\ &= \frac{2205 + 171}{37} = \frac{2376}{37} = 64.21 \approx 64.20 \end{aligned}$$

- 16. The average marks obtained by James in Maths, Science and History is 89. If the marks of Language is also added then the averages decreases to 88.25. Find out the marks obtained by him in the Language.**

- (a) 90 (b) 82
 (c) 86 (d) 83

RRB NTPC 28.03.2016 Shift : 3

Ans : (c) Marks obtained by James in the language

$$\begin{aligned} &= 4 \times 88.25 - 3 \times 89 \\ &= 353 - 267 = 86 \end{aligned}$$

Type - 3

Problems Based on Average Age and Average Weight

- 17. The average weight of 14 students of a class is 20 kg. If a student leaves the class the average weight of the class drops by 2 kg. Find the weight of the student (in kg) who left the class.**

- (a) 43 (b) 49
 (c) 45 (d) 46

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (d) : Let total weight of 14 students of a class
 $= 14 \times 20 = 280 \text{ kg}$

According to the question,

$$\Rightarrow \frac{280 - x}{13} = 18$$

$$\Rightarrow 280 - x = 234$$

$$\Rightarrow x = 280 - 234$$

$$\Rightarrow x = 46$$

Hence, weight of student who left the class = 46 kg

- 18. The average weight of P, Q and R is 58 kg. If the average weight of P and Q is 54 kg and that of Q and R is 48 kg, then the weight of Q is:**

- (a) 26 kg (b) 32 kg
 (c) 30 kg (d) 28 kg

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (c) :

Average weight of P, Q and R = 58 kg

Total weight of P, Q and R = $58 \times 3 = 174 \text{ kg}$

$P + Q + R = 174 \text{ kg}$... (i)

Average weight of P and Q = 54 kg

Total weight of P and Q = $54 \times 2 = 108 \text{ kg}$

$P + Q = 108 \text{ kg}$... (ii)

Average weight of Q and R = 48 kg

Total weight of Q and R = $48 \times 2 = 96 \text{ kg}$

$Q + R = 96 \text{ kg}$... (iii)

From equation (ii) and (iii),

$P + 2Q + R = 204 \text{ kg}$... (iv)

On subtracting equation (i) from equation (iv),

Hence, $Q = 30 \text{ kg}$

- 19. The average weight of an apple in a sample of 10 apples was calculated as 104 g. Later on, it was found that the weighing had shown the weight of each apple 20 g less. The correct average weight of an apple in that sample is:**

- (a) 84 g (b) 124 g
 (c) 200 g (d) 1240 g

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : From above question,

Total average weight of 10 apples = $10 \times 104 \text{ g} = 1040 \text{ g}$

Decrease in the total average weight of 10 apples

$$= 10 \times 20$$

$$= 200 \text{ g}$$

$$\text{Correct average weight} = \frac{1040 + 200}{10} = \frac{1240}{10} = 124 \text{ g}$$

- 20. The average weight of A, B, C, and D is 56 kg. If the average weight of A, B and C is 52 kg and that the average weight of C and D is 48 kg, then the weight of C is—**

- (a) 28 kg (b) 36 kg
 (c) 34 kg (d) 30 kg

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (a) : Weight of A + B + C + D = $56 \times 4 = 224 \text{ kg}$

Weight of A + B + C = $52 \times 3 = 156 \text{ kg}$

Weight of C + D = $48 \times 2 = 96 \text{ kg}$

Adding eq. (ii) and (iii) and subtracting eq. (i),

Weight of C = $(156 + 96) - 224 \text{ kg}$

$$= (252 - 224) \text{ kg}$$

$$= 28 \text{ kg}$$

- 21. As of this year, the average age of a family of 8 members is 39 years. Assuming that after six years the family adopts a new-born baby, what will be the average age of the family 10 years from now?**

- (a) 46 years 8 months (b) 49 years 6 months
 (c) 49 years (d) 44 years

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (d) : At present, total age of the family = $39 \times 8 = 312 \text{ years}$

Age of new born would be 4 years, as it was adopted after 6 years of present age.

Sum of age after 10 years from present age

$$= 312 + 4 + 8 \times 10$$

$$= 396 \text{ years}$$

$$\text{Average age of the whole family} = \frac{396}{9} = 44 \text{ years}$$

- 22. The average of ages of 9 children in a joint family is 14 years. The ages of their grandfather and grandmother are 71 years and 67 years respectively. Find the average of the ages of children and grandparents.**

- (a) 25 years (b) 51 years
 (c) 24 years (d) 16 years

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : Total sum of age of 9 children = $9 \times 14 = 126 \text{ years}$

Total sum of age of children, grandfather and grandmother = $126 + 71 + 67 = 264 \text{ years}$

Average of ages of children and grand parents

$$= \frac{264}{11} = 24 \text{ years}$$

- 23. At present the average age of 20 students of class ten is 15.5 years. The present age of the class teacher is 47 years. What will be the average age of the students and the class teacher after 5 years?**

- (a) 22.5 years (b) 22 years
 (c) 21.8 years (d) 21.5 years

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (b) : Total age of the students and the class teacher
 $= 20 \times 15.5 + 47$
 $= 310 + 47 = 357$ years
 Total age of the students and the class teacher after 5 years $= 357 + 20 \times 5 + 5 = 462$ years
 \therefore Hence, required average age $= \frac{462}{21} = 22$ years

24. The captain of a cricket team of 11 members is 35 years old and the wicket keeper is 5 years older than the captain. If the ages of these two are excluded, the average of the remaining players is three years less than the average of the whole team. What is the average age of the whole team.

- (a) 26 years (b) 24 years
 (c) 28 years (d) 25 years

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (b) Let the average age of whole team be x years –
 According to the question,

$$\frac{11x - 35 - 40}{9} = x - 3$$

 $11x - 75 = 9x - 27$
 $2x = 75 - 27$
 $2x = 48$
 $x = 24$ years

25. The average of the ages of three friends is 22. If the average of the ages of four friends is 24, then find the age of the fourth friend.

- (a) 31 (b) 30
 (c) 22 (d) 24

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (b) : The average of the ages of three friends $= 22$
 Total age of three friends $= 22 \times 3 = 66$
 The average of the ages of four friends $= 24$
 Total age of four friends $= 24 \times 4 = 96$
 Age of fourth friend $=$ Total age of four friends –
 Total age of three friends $= 96 - 66 = 30$

26. The average age of 40 students is 30 years, average age of 25 students is 36 years. Find the average age of the remaining of the students?

- (a) 20 (b) 15
 (c) 25 (d) 18

RRB NTPC 05.04.2016 Shift : 2

Ans : (a) Average age of remaining students

$$= \frac{40 \times 30 - 25 \times 36}{40 - 25}$$

$$= \frac{1200 - 900}{15}$$

$$= \frac{300}{15} = 20 \text{ years}$$

27. If the average age of 40 students of class Ist is 10 years and the average age of 30 students in class IInd is 12 years. Find the average age of all students (in years).

- (a) 11 (b) 10.54
 (c) 10.58 (d) 10.85

RRB NTPC 29.04.2016 Shift : 2

Ans : (d) Total age of 40 students $= 10 \times 40 = 400$ years
 Total age of 30 students $= 12 \times 30 = 360$ years
 Average age of all students $= \frac{400 + 360}{70}$
 $= \frac{760}{70} = 10.85$ years

Type - 4

Problems Based on Finding The Value of Any One Result

28. The average of 6 numbers is 16. If one of the number is excluded the average become 17. Find the excluded number.

- (a) 13 (b) 12
 (c) 10 (d) 11

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) :

Total sum of 6 numbers $= 16 \times 6 = 96$
 Total sum of 5 numbers $= 17 \times 5 = 85$
 Hence, Excluded number $= 96 - 85 = 11$

29. A family spends ₹4600, ₹5600, ₹4800, ₹3800, and ₹6000, on groceries in the first 5 months of a year. How much should the family spend in the 6th month to make the 6 months average spending of family on groceries to ₹4500?

- (a) ₹3500 (b) ₹3650
 (c) ₹4500 (d) ₹2200

RRB NTPC (Stage-2) 12/06/2022 (Shift-I)

Ans. (d) : Total expenditure of 6 months of family
 $= 6 \times 4500 = ₹ 27000$
 First 5 month expenditure of family.

$$4600 + 5600 + 4800 + 3800 + 6000 = ₹ 24800$$

\therefore Total expenditure of 6th month $= 27000 - 24800$
 $= ₹ 2200$

30. The mean of 21 observations is 42. If out of 21 given observations, the mean of the first 11 observations is 50 and the mean of the last 11 observations is 35, then the 11th observation will be:

(a) 50 (b) 53
(c) 35 (d) 40

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

$$\text{Sum of total observations} = 21 \times 42 = 882$$

$$\text{Sum of first 11 observations} = 11 \times 50 = 550$$

$$\text{Sum of last 11 observations} = 11 \times 35 = 385$$

$$\begin{aligned} 11^{\text{th}} \text{ observation} &= (550 + 385) - 882 \\ &= 935 - 882 = 53 \end{aligned}$$

31. What is the third number in a group of three numbers with a combined average of 29, when the average of the other two numbers is 13?

(a) 61 (b) 28
(c) 34 (d) 30

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (a) : Average of a group of three numbers = 29

$$\text{Sum of a group of three numbers} = 3 \times 29 = 87$$

$$\text{Average of two of those numbers} = 13$$

$$\text{Sum of both the numbers} = 2 \times 13 = 26$$

Third number = sum of three numbers – sum of two numbers.

$$\therefore \text{Third number} = 87 - 26 = 61$$

32. The average of 11 numbers is 44. If the average of the first 6 numbers is 39 and that of the last 6 numbers is 48, then what is the 6th number?

(a) 34 (b) 36
(c) 38 (d) 32

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (c) : Average = $\frac{\text{Sum of observations}}{\text{Number of observations}}$

$$44 = \frac{\text{Sum of 11 numbers}}{11}$$

$$\text{Sum of 11 numbers} = 484$$

$$\text{And, sum of last 6 numbers} = 6 \times 48 = 288$$

$$\text{Sum of first 6 numbers} = 6 \times 39 = 234$$

$$\begin{aligned} \text{Therefore, 6}^{\text{th}} \text{ number} &= (\text{Sum of first 6 numbers} + \text{Sum of last 6 numbers}) - \text{Sum of 11 numbers} \\ &= 288 + 234 - 484 \\ &= 38 \end{aligned}$$

33. Average of 11 results is 50. The average of first 6 results is 49 and last 6 results average is 52. Then what will be the value of the 6th result?

(a) 48 (b) 51
(c) 56 (d) 49

RRB NTPC 02.04.2016 Shift : 3

Ans : (c) 6th result = Total of first 6 results + Total of last 6 results - Total of 11 results.

$$= 6 \times 49 + 6 \times 52 - 11 \times 50$$

$$= 294 + 312 - 550$$

$$= 606 - 550 = 56$$

34. The average of 45 results is 23. The average of first 22 is 18 and last 22 is 21. What is the value of 23rd result?

(a) 172 (b) 190
(c) 177 (d) 187

RRB NTPC 18.04.2016 Shift : 3

Ans : (c) Sum of 45 results = $45 \times 23 = 1035$

$$\text{Sum of first 22 results} = 22 \times 18 = 396$$

$$\text{Sum of last 22 results} = 22 \times 21 = 462$$

$$\begin{aligned} \therefore \text{Value of 23rd results} &= 1035 - (396 + 462) \\ &= 1035 - 858 = 177 \end{aligned}$$

35. Three numbers are given in which the second number is thrice the first, and twice the third number. If the average of three numbers is 66. Then find the first number?

(a) 36 (b) 54
(c) 108 (d) 72

RRB NTPC 12.04.2016 Shift : 3

Ans : (a) Let the second number be = x

$$\therefore \text{First number} = \frac{x}{3}$$

$$\text{Third number} = \frac{x}{2}$$

\therefore From question,

$$\frac{\frac{x}{3} + x + \frac{x}{2}}{3} = 66$$

$$\Rightarrow \frac{2x + 6x + 3x}{6 \times 3} = 66$$

$$\Rightarrow \frac{11x}{18} = 66$$

$$\Rightarrow x = 6 \times 18 = 108$$

$$\therefore \text{First number} = \left(\frac{x}{3}\right) = \frac{108}{3} = 36$$

36. The average of the results of 35 tests is 21. The average of the first 17 results is 19 and that of the last 17 is 22. What is the value of the result of the 18th test?

(a) 42 (b) 36
(c) 38 (d) 34

RRB NTPC 12.04.2016 Shift : 2

Ans : (c) According to the question–

$$\text{Sum of 35 tests} = 35 \times 21 = 735$$

$$\text{Average of 17 tests} = 19$$

$$\text{Sum of 17 tests} = 17 \times 19 = 323$$

$$\text{Average of last 17 tests} = 22$$

$$\text{Sum of last 17 tests} = 17 \times 22 = 374$$

$$\text{Value of 18}^{\text{th}} \text{ tests} = 735 - 374 - 323 = 38$$

Type - 5

Average Problems Based on Table

37. The following table shows the weight (in kg) of workers in a factory:

Weight (in kg)	65	55	70	50	60
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What is the average weight of the workers?

- (a) 55 (b) 70
(c) 65 (d) 60

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,

$$\begin{aligned} \text{The average weight of workers} &= \frac{65 + 55 + 70 + 50 + 60}{5} \\ &= \frac{300}{5} = 60 \end{aligned}$$

38. The given table shows the number of passengers on an aircraft and their corresponding weight (in kg), for a total of 40 passengers. Answer the question given below based on the table.

No. of passengers	4	15	6	5	3	7
Weight (in kg)	90	60	75	78	72	45

What is the average weight of all the 40 passengers?

- (a) 65.77 kg (b) 80.57 kg
(c) 75.77 kg (d) 72.57 kg

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,

$$\begin{aligned} \therefore \text{The average weight} &= \frac{90 \times 4 + 60 \times 15 + 75 \times 6 + 78 \times 5 + 72 \times 3 + 45 \times 7}{40} \\ &= \frac{360 + 900 + 450 + 390 + 216 + 315}{40} \\ &= \frac{2631}{40} \\ &= 65.77 \text{ kg} \end{aligned}$$

Type - 6

Miscellaneous

39. The average spending of a family per week during a four-week period on essentials items was ₹1475. During the first three weeks the family spent ₹1200, ₹1500 and ₹1875 on such items. How much did the family spend on these items in the final week to ensure that the weekly average is maintained?

- (a) ₹1275 (b) ₹1375
(c) ₹1325 (d) ₹1225

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : Let the amount spent in the last week be x.

$$\text{Average} = \frac{\text{Sum of expenditure of weeks}}{\text{Total number of weeks}}$$

$$1475 = \frac{1200 + 1500 + 1875 + x}{4}$$

$$5900 - 4575 = x$$

$$x = ₹1325$$

40. 10 is the average of a set of 7 observations and 5 is the average of another set of 3 observations. The average of the combined set is:

- (a) 10 (b) 7.5
(c) 15 (d) 8.5

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,

$$\text{Average} = \frac{\text{Sum of observations}}{\text{Number of observations}}$$

$$\text{Sum of 7 observations} = 7 \times 10 = 70$$

$$\text{Sum of 3 observations} = 3 \times 5 = 15$$

$$\begin{aligned} \therefore \text{Average of the combined set} &= \frac{70 + 15}{3 + 7} \\ &= \frac{85}{10} \\ &= 8.5 \end{aligned}$$

41. The average of 20 observations is 50. It was later found that two observations 13 and 24 were incorrectly recorded as 31 and 42. The correct mean is :

- (a) 47.25 (b) 48.20
(c) 50 (d) 51.85

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (b) : Average of 20 observations = 50

$$\text{Total sum of 20 observations} = 20 \times 50 = 1000$$

$$\text{Sum of two correct observations} = 13 + 24 = 37$$

$$\text{Sum of two incorrect observations} = 31 + 42 = 73$$

$$\begin{aligned} \text{Correct Average} &= \frac{1000 + (37 - 73)}{20} \\ &= \frac{1000 - 36}{20} = \frac{964}{20} \\ &= 48.20 \end{aligned}$$

42. The average of x and y is 400, and the ratio of x to y is 3 : 7. What is the value of $y - x$?
- (a) 230 (b) 800
(c) 320 (d) 130

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$\frac{x+y}{2} = 400$$

$$x + y = 800$$

$$x = \frac{3 \times 800}{10}$$

$$= 240$$

$$y = \frac{7 \times 800}{10}$$

$$= 560$$

$$\text{Hence, } y - x = 560 - 240 \\ = 320$$

43. The average of $m + 3$, $m + 5$, $m + 6$, $m + 9$ and $m + 12$ is?
- (a) $m + 7$ (b) $m + 9$
(c) $m + 3$ (d) $m + 6$

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (a) : Average = $\frac{\text{Sum of observations}}{\text{Number of observations}}$

$$= \frac{(m+3) + (m+5) + (m+6) + (m+9) + (m+12)}{5}$$

$$= \frac{(5m+35)}{5}$$

$$= \frac{5(m+7)}{5}$$

$$= (m+7)$$

44. The sum of 7 numbers is 1050. The average of first 3 numbers is 120 and, fourth number is 126, then find the average of last 3 numbers.
- (a) 200 (b) 165
(c) 188 (d) 173

RRB NTPC 05.04.2016 Shift : 2

Ans : (c) Sum of the first three numbers = $120 \times 3 = 360$

Fourth number = 126

$$\text{Sum of the last three numbers} = 1050 - (360 + 126) \\ = 1050 - 486 \\ = 564$$

Hence, the average of the last three numbers are =

$$\frac{564}{3} = 188$$

45. Expenditure of a person has increased by ₹50000 in the months of February and March. If his expenditure in January was ₹50000, then find his average expenditure (in ₹) from January to March.

- (a) 100000 (b) 150000
(c) 75000 (d) 50000

RRB NTPC 27.04.2016 Shift : 3

Ans : (a) Expenditure in January = ₹ 50000

According to the question,

∴ Expenditure in the month of February

$$= 50000 + 50000$$

$$= ₹ 100000$$

Expenditure in the month of March = $100000 + 50000$

$$= ₹ 150000$$

Hence, Average expenditure from January to March

$$= \frac{50000 + 100000 + 150000}{3}$$

$$= \frac{300000}{3} = ₹ 100000$$

46. If the average of a_1, a_2, a_3 and a_4 is 19.5, $a_1 = 21$ and the average of a_1, a_2 and a_3 is equal to the average of a_2, a_3 and a_4 , then what will be the value of a_4 ?

- (a) 18 (b) 20
(c) 21 (d) 25

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

Average of a_1, a_2 and a_3 = Average of a_2, a_3 and a_4

$$\frac{a_1 + a_2 + a_3}{3} = \frac{a_2 + a_3 + a_4}{3}$$

$$\Rightarrow 3a_1 + 3a_2 + 3a_3 = 3a_2 + 3a_3 + 3a_4$$

$$\therefore a_1 = a_4$$

and $a_1 = 21$ (Given in the question)

$$\therefore a_4 = 21$$

47. The marks obtained in a test by students of a class are given below.

Scores of how many students are within a, +2/-2 range of the average score of the class?

23, 2, 15, 38, 21, 19, 24, 26

- (a) 3 (b) 2
(c) 4 (d) 1

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : Average of total students

$$= \frac{23 + 2 + 15 + 38 + 21 + 19 + 24 + 26}{8} = 21$$

According to the question,

3 students are within a +2/-2 range of average score of classes which are 23, 21, 19.

18.

Speed, Time & Distance

Type - 1

Problems Based on Finding Speed

1. In covering a distance of 60 km. Arjun takes 2 hours more than Rohit. If Arjun doubles his speed, then he would take 1 hour less than Rohit. Arjun's original speed is :

- (a) 15 km/h (b) 25 km/h
(c) 5 km/h (d) 10 km/h

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (d) : Let, Speed of Arjun and Rohit is x and y km/h respectively.

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\frac{60}{x} - \frac{60}{y} = 2 \text{ --- (1)}$$

$$\frac{60}{y} - \frac{60}{2x} = 1 \text{ --- (2)}$$

From equation (i) and (ii),

$$\frac{60}{2x} = 3$$

$$x = 10 \text{ km/h}$$

2. The ratio of the speeds of a bus and a car is 7:11. If the car covers a distance of 396 km in 6 hours, what is the speed of the bus in km/h?

- (a) 42 (b) 45.5
(c) 38.5 (d) 35

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (a) : Given,

$$\frac{\text{Speed of bus}}{\text{Speed of car}} = \frac{7}{11}$$

$$\frac{\text{Speed of bus}}{396/6} = \frac{7}{11}$$

$$\frac{\text{Speed of bus}}{66} = \frac{7}{11}$$

\therefore Speed of bus = $6 \times 7 = 42$ km/h

3. A train covers a distance of 57.6 km in 48 minutes. What is its speed in m/s?

- (a) 24 (b) 18
(c) 21 (d) 20

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (d) : Speed = Distance / Time

$$\text{Speed} = \frac{57.6 \text{ km}}{48 \text{ m}}$$

$$= \frac{57600}{48 \times 60} = 20 \text{ m/sec}$$

4. A student reaches school on his bicycle in $3/2$ hours at a speed of 8 km/h. On the return journey he rests for half an hour and takes a route which is 1 km shorter. What should be the percentage increase in the speed of the bicycle so that he reaches home in the same time?

- (a) 37% (b) 37.5%
(c) 30.5% (d) 35%

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given,

Initial speed of student = 8 km/h

$$\text{Time} = \frac{3}{2} \text{ hours}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$= 8 \times \frac{3}{2} = 12 \text{ km}$$

According to the question-

Let, the speed has increased by x km/h.

$$12 - 1 = (x + 8) \times \left(\frac{3}{2} - \frac{1}{2} \right)$$

$$11 = (x + 8) \times \frac{2}{2}$$

$$x = 3 \text{ km/h}$$

$$\text{Percentage increase in speed} = \frac{3}{8} \times 100 = 37.5\%$$

5. Sachin and Anil started walking at the same time towards Kalka which is 50 km away from Chandigarh. The speed of Sachin is 6 km/h less than that of Anil. Anil reaches Kalka and immediately starts walking back to Chandigarh. On the way he meets Sachin at a distance of 20 km from Kalka. Find the speed of Sachin :

- (a) 4.5 km/h (b) 5.1 km/h
(c) 4.9 km/h (d) 5.0 km/h

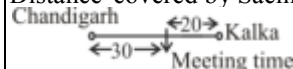
RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (a) : Let speed of Sachin = V km/h

So speed of Anil = $V + 6$ km/h

And distance covered by Anil = 70 km

Distance covered by Sachin = 30 km



\therefore Time is same for both in the whole journey.

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} \Rightarrow \frac{D_1}{V_1} = \frac{D_2}{V_2}$$

$$\Rightarrow \frac{30}{V} = \frac{70}{V+6}$$

$$\Rightarrow 3V + 18 = 7V$$

$$\Rightarrow 4V = 18$$

$$\Rightarrow V = \frac{18}{4} = \frac{9}{2}$$

$$\Rightarrow V = 4.5 \text{ km/h}$$

6. Ramu can reach a certain distance to 30 hours. If he reduce his speed by $\frac{1}{15}$ th, he goes 10 km less in that time. Find his speed.

- (a) 4 km/h (b) 5 km/h
(c) $5\frac{1}{2}$ km (d) 6 km/h

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (b) : Let distance = x km

Speed of Ramu = y km/h

From, Speed = $\frac{\text{Distance}}{\text{Time}}$

In first condition-

$$y = \frac{x}{30} \dots\dots(i)$$

In second condition-

$$\frac{14y}{15} = \frac{(x-10)}{30}$$

$$420y = 15x - 150 \dots\dots(ii)$$

On putting the value of $y = \frac{x}{30}$ from equation (1) in equation (ii)-

$$420 \times \frac{x}{30} = 15x - 150$$

$$\frac{42x}{3} = 15x - 150$$

$$14x - 15x = -150$$

Distance (x) = 150 km

Now from equation (i)-

$$\text{Speed (y)} = \frac{150}{30}$$

Speed (y) = 5 km/h.

7. A and B start driving simultaneously from point X and go towards point Y. X and Y are 60 km apart. A's speed is 4 km/h less than that of B. B, after reaching Y, returns and meets A at a point 12 km away from Y. Find the speed of A.

- (a) 16 km/h (b) 12 km/h
(c) 8 km/h (d) 20 km/h

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the speed of A = x km/h

Then speed of B = (x + 4) km/h

Total distance covered by B = 60 + 12
= 72 km

Total distance covered by A = 60 - 12
= 48 km

According to the question,

$$\frac{72}{x+4} = \frac{48}{x}$$

$$72x = 48x + 192$$

$$24x = 192$$

$$x = 8 \text{ km/h}$$

Hence, speed of A = 8 km/h

8. Two boys Rishi and Vamsi start at the same time to ride from Lucknow to Kanpur that is 95 km away. Rishi travels 5 km/h slower than Vamsi. Vamsi reaches Kanpur and immediately start to travel back. On his return journey he meets Rishi who is 25 km away from Kanpur.

Find Rishi's speed.

- (a) 8 km/h (b) 5 km/h
(c) 7 km/h (d) 6 km/h

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (c) : Distance travelled by Vamsi from Lucknow to Kanpur and back to meet Rishi = 95 + 25 = 120 km. and distance travelled by Rishi = 95 - 25 = 70 km.

It took t time for Rishi and Vamsi to cover this distance

Assume that speed of Vamsi = v km/hour

speed of Rishi = v - 5 km/hour

So, according to the question-

$$\frac{120}{v} = \frac{70}{v-5}$$

$$120(v-5) = 70v$$

$$120v - 600 = 70v$$

$$120v - 70v = 600$$

$$50v = 600$$

$$v = \frac{600}{50} = 12 \text{ km/hour}$$

Hence speed of Rishi = v - 5 = 12 - 5 = 7 km/hour

9. A salesman has to cover 6 km in $\frac{3}{4}$ h. If he covers $\frac{1}{2}$ of the distance in $\frac{2}{3}$ of the total time, then what must be his speed (in km/h) to cover the remaining distance in the remaining time?

- (a) 8 (b) 15
(c) 12 (d) 6

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (c) : Distance covered by the salesman in $\frac{2}{3}$ of the

$$\text{total time} = \text{Total distance} \times \frac{1}{2} = 6 \times \frac{1}{2} = 3 \text{ km}$$

Remaining distance = 6 - 3 = 3 km.

$$\text{Remaining time} = \frac{3}{4} \text{ h} \times \left(1 - \frac{2}{3}\right) = \frac{1}{4} \text{ h}$$

So the speed of the salesman to cover the remaining

$$\text{distance} = \frac{\text{Distance}}{\text{Time}} = \frac{3}{1/4} = 12 \text{ km/h}$$

10. Two cars travel from the same houses at a speed of 20 km/h at an interval of 10 minutes. At what speed does a woman come in the opposite direction towards the house. If she gets cars in 8 minutes interval.

- (a) 5 (b) 6
(c) 7 (d) 4

RRB NTPC 17.01.2017 Shift-1

Ans : (a) Let the speed of woman is x Km./hr. and the woman's distance from the house is l km and at t time the woman gets the first car.

Then-

$$x \times t + 20t = l \dots\dots (i)$$

$$\text{and } \left(t + \frac{8}{60}\right)x + \left(t + \frac{8-10}{60}\right) \times 20 = l$$

$$xt + \frac{8x}{60} + 20t - \frac{20 \times 2}{60} = xt + 20t$$

$$\frac{8x}{60} = \frac{40}{60}$$

$$x = 5 \text{ Km./hr.}$$

11. Two bicycles from a house started at a speed of 24 km/h at an interval of 15 minutes. How much more speed does a woman coming from the opposite direction of the house have to walk so that she meet a cycle at an interval of 10 minutes.

- (a) 13 (b) 11
(c) 12 (d) 14

RRB NTPC 11.04.2016 Shift : 1

Ans : (c) Distance travelled by cycle in 15 minutes

$$= 24 \times \frac{15}{60} = 6 \text{ km.}$$

$$\text{Hence speed of woman} = \frac{6}{\frac{10}{60}} = \frac{6 \times 60}{10} = 36 \text{ Km./hr.}$$

$$\therefore \text{Required speed} = 36 - 24 = 12 \text{ Km./hr.}$$

12. Rupa goes to her office at half of the speed at which she returns from her office. The average speed during the entire journey is 24 km/h. What was her speed when Rupa was going to her office.

- (a) 18 Km./hr. (b) 72 Km./hr.
(c) 9 Km./hr. (d) 24 Km./hr.

RRB NTPC 22.04.2016 Shift : 3

Ans : (a) Let the actual speed of Rupa = S Km./hr.

$$\text{Average speed} = \frac{2V_1 V_2}{V_1 + V_2}$$

$$\therefore 24 = \frac{2 \times S \times \frac{S}{2}}{S + \frac{S}{2}}$$

$$\Rightarrow 12 = \frac{S^2}{3S}$$

$$\therefore S = 36 \text{ Km./hr.}$$

Hence speed of Rupa when she was going to her office

$$= \frac{36}{2} = 18 \text{ km/h}$$

13. Two vehicles from a house moved at a speed of 25 km/h. At an interval of 20 minutes. How much more speed a woman coming from the opposite direction of the house will have to walk so that she gets a vehicle at an interval of 18 minutes.

(a) 2

(b) $2\frac{5}{9}$

(c) $2\frac{7}{9}$

(d) $2\frac{8}{9}$

RRB NTPC 26.04.2016 Shift : 2

Ans : (c) Distance covered by vehicle in 20 minutes

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$= 25 \times \frac{20}{60} \text{ km.}$$

$$= 25 \times \frac{1}{3} = \frac{25}{3} \text{ km.}$$

Let the speed of woman = x Km./hr.

\therefore From question,

$$\frac{\frac{25}{3}}{25 + x} = \frac{18}{60}$$

$$\Rightarrow \frac{25}{3(25 + x)} = \frac{18}{60}$$

$$\Rightarrow \frac{25}{75 + 3x} = \frac{18}{60}$$

$$\Rightarrow \frac{25}{75 + 3x} = \frac{3}{10}$$

$$\Rightarrow 250 - 225 = 9x$$

$$\Rightarrow 25 = 9x$$

$$\Rightarrow x = \frac{25}{9}$$

$$\text{Hence speed of woman} = 2\frac{7}{9} \text{ Km./hr.}$$

Type - 2

Problems Based on Finding Time

14. When the speed of a car is increased by 30%, it takes 24 minutes less to cover the same distance. What is the time taken by it to cover the same distance at its usual speed.

- (a) 1 hour 40 minutes (b) 1 hour 55 minutes
(c) 1 hour 50 minutes (d) 1 hour 44 minutes

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (d) : Let the speed of car is 100 km/h and time be t hour.

According to the question,

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$= 100 \times t$$

$$100 \times t = 100 \times \frac{130}{100} \times (t - 24)$$

$$100t = 130 \times (t - 24)$$

$$100t = 130t - 3120$$

$$130t - 100t = 3120$$

$$30t = 3120$$

$$t = \frac{3120}{30}$$

$$= 104 \text{ minute or 1 hour 44 minute}$$

15. At the same time A and B start moving toward each other from two different places. 240 km apart. The ratio of the speeds of A and B is 5 : 7 and the speed of B is 84 km/h. After how many minutes will A and B meet each other?
- (a) 90 minutes (b) 100 minutes
(c) 80 minutes (d) 120 minutes

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (b) : Given,

Distance between A and B = 240 km.

Ratio of speed of A and B = 5 : 7

$$= 5x, 7x \text{ (Let)}$$

According to the question,

Speed of B = $7x = 84$ km/h

$$x = 12 \text{ km/h}$$

Speed of A = $5x = 5 \times 12 = 60$ km/h

Hence, Time taken by A and B to meet each other

$$\begin{aligned} &= \frac{240}{144} \text{ h} \\ &= \frac{240}{144} \times 60 \text{ minutes} \\ &= 100 \text{ minutes} \end{aligned}$$

16. The ratio of the speeds of A and B is 4:5 and hence A takes 20 minutes more than the time taken by B to reach the destination. If A had walked at double his speed, he would have covered the distance in :

- (a) 80 min (b) 40 min
(c) 50 min (d) 100 min

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (c) : Let ratio of speed of A and B are $4x$ and $5x$ respectively.

$$\therefore \text{Speed} \propto \frac{1}{\text{Time}}$$

$$\therefore \text{Ratio of time} = 5x : 4x$$

According to the question,

$$5x - 4x = 20$$

$$x = 20$$

Time taken by A = $5x$

$$= 5 \times 20$$

$$= 100 \text{ minutes}$$

Time taken by B = $4x$

$$= 4 \times 20$$

$$= 80 \text{ minutes}$$

When A's speed is double then time is half.

Hence, A covered distance in 50 minutes.

17. Akshita covers a distance of 300 km at the speed of 50 km/h, then 360 km at 30 km/h and another 420 km at 60 km/h. If her average speed for the whole journey is k km/h, then how much time (in hours) will she take to cover 216 km at k km/h?

- (a) 5 hours (b) 7 hours
(c) 6 hours (d) 4 hours

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (a) : Let time taken by Akshita covered distance is t_1 , t_2 and t_3 .

$$t_1 = \frac{300}{50} = 6 \text{ h}$$

$$t_2 = \frac{360}{30} = 12 \text{ h}$$

$$t_3 = \frac{420}{60} = 7 \text{ h}$$

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total Time}}$$

$$k = \frac{300 + 360 + 420}{6 + 12 + 7}$$

$$k = \frac{1080}{25}$$

$$k = 43.2 \text{ km/h}$$

According to the question,

$$\begin{aligned} &= \frac{216}{43.2} \\ &= 5 \text{ Hours.} \end{aligned}$$

18. Excluding stoppages, the speed of a bus is 45 kmph and including stoppages, it is 27 kmph. For how many minutes does the bus stop per hour?

- (a) 24 mins (b) 36 mins
(c) 20 mins (d) 40 mins

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (a) : According to the question,

$$\text{Required time} = \frac{\text{Difference between speed}}{\text{speed of bus without stoppages}}$$

$$= \frac{45 - 27}{45}$$

$$= \frac{18}{45} = \frac{2}{5} \text{ Hour or 24 minute}$$

19. A started a journey at 1:00 p.m. at a speed of 40 km/h. B started from the same spot and in the same direction at 1:40 p.m. at a speed of 50 km/h. How many minutes will be take to catch up with A?

- (a) 150 min (b) 120 min
(c) 140 min (d) 160 min

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given that

$$\text{Speed of A} = 40 \text{ km/h}$$

$$\text{Speed of B} = 50 \text{ km/h}$$

Distance covered by A in 40 minutes = Speed \times Time

$$= \frac{40}{60} \times 40 = \frac{160}{6} \text{ km}$$

Now B cover $\frac{160}{6}$ km more distance to catch up with A.

$$\frac{\text{Distance}}{\text{Relative speed}} = \frac{\frac{160}{6}}{10} = \frac{160}{60} = \frac{16}{6}$$

$$2 \text{ hours } 40 \text{ minutes} = 160 \text{ minutes}$$

20. Anupam and Vineet standing together started running in opposite direction on 2 km long circular racing track. They ran at the speeds of 9 km/h and 11 km/h respectively. After how much time will they meet on the track?

(a) 12 min (b) 20 min
(c) 10 min (d) 6 min

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (d) : Let both meet after t time.

According to the question-

$$9t + 11t = 2$$

$$\Rightarrow 20t = 2$$

$$\Rightarrow t = \frac{2}{20} = \frac{1}{10} \text{ hours}$$

$$\Rightarrow t = \frac{1 \times 60}{10} = 6 \text{ minutes}$$

21. A bus covers a distance of 5 km in 20 min. If its speed is decreased by 3 km/hr, then find the time taken by the bus to cover the same distance.

(a) 30 min (b) 15 min
(c) 25 min (d) 20 min

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed of bus} = \frac{5}{\frac{20}{60}} = 15 \text{ km/h}$$

\therefore On decreasing the speed of bus by 3 km/h -

$$\text{New speed} = 15 - 3 = 12 \text{ km/h}$$

$$\begin{aligned} \text{Required time} &= \frac{5}{12} \times 60 \\ &= 25 \text{ minutes} \end{aligned}$$

22. Devesh leaves his home every day at 7 am and reaches office at 8:30 am. One day he left his home at 7 am but travelled a fifth of the distance at 5/6 of the usual speed and the rest of the distance at 6/5 of the usual speed. Approximately at what time did Devesh reach office on that day?

(a) 8 : 40 am (b) 8 : 25 am
(c) 8 : 21 am (d) 9 : 36 am

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let Devesh's usual speed = x km/hr

Total time taken by Devesh to reach office from his home = 8:30 - 7:00 = 1 hour 30 minutes

Distance = Speed \times Time

$$= x \times \frac{3}{2} \text{ km}$$

According to the question,

$$\text{Speed to cover } \left(\frac{3x}{2} \times \frac{1}{5} \right) \text{ km distance} = \frac{5x}{6} \text{ km/hr}$$

$$\text{Remaining distance} = \frac{3x}{2} - \frac{3x}{10} = \frac{12x}{10} \text{ or } \frac{6x}{5} \text{ km}$$

$$\text{Speed to cover } \frac{6x}{5} \text{ km} = \frac{6x}{5} \text{ km/hr}$$

Suppose the time taken by Devesh to reach office = t hour.

$$\frac{\frac{3x}{2}}{\frac{5x}{6}} + \frac{\frac{6x}{5}}{\frac{6x}{5}} = t$$

$$\frac{18}{50} + 1 = t$$

$$t = \frac{34}{25} \text{ hours}$$

$$= 1 \text{ hour } 21 \text{ minutes (approximately)}$$

Therefore, that day Devesh reach office approximately Morning 8 : 21 am

23. Mrs. Vijaya takes 9 hours and 50 minutes to walk from her starting point to a certain destination and return to her starting point by running again. It takes 12 hours and 20 minutes to walk from both the origin and the destination to the destination and again from the destination to the original place, both by running and in how much times she will complete.

(a) 7 hours 45 minutes
(b) 7 hours 30 minutes
(c) 7 hours 15 minutes
(d) 7 hours 20 minutes

RRB NTPC 19.01.2017 Shift : 3

Ans : (d) Given, Time taken by vijaya to travel and reach certain distance on foot and by running = 9 hours 50 minutes

Time taken by vijaya to walk both sides = 12 hours 20 minutes

Time taken by vijaya to walk one side = 6 hours 10 minutes

Time taken by vijaya to cover the distance by running = 9 hours 50 minutes - 6 hours 10 minutes = 3 hours 40 minutes

So, time taken to cover the distance on both sides by running.

$$= 2 \times (3 \text{ hours } 40 \text{ minutes})$$

$$= 6 \text{ hours } 80 \text{ minutes}$$

$$\text{Total time} = 7 \text{ hours } 20 \text{ minutes}$$

24. A trip from mumbai to pune takes 4 hours 30 minutes to run at a speed of 60 km/h. How much time will it take us to travel at the speed of 15 m/s.

- (a) $3\frac{3}{4}$ hours (b) 5 hours
(c) $4\frac{2}{3}$ hours (d) 4 hours

RRB NTPC 18.01.2017 Shift : 2

Ans : (b) Let the distance = x km
Distance covered in 270 minutes at a speed of 60 Km./hr.

$$\Rightarrow 60 \text{ (speed)} = \frac{x \text{ (distance)}}{\frac{270}{60} \text{ (time)}} \Rightarrow 60 = \frac{60x}{270}$$

$$x = 270 \text{ km}$$

$$15 \text{ m/s} = 15 \times \frac{18}{5} = 54 \text{ km/h}$$

Time taken to cover distance of 270 km at a speed of 54 Km./hr.

$$\frac{270}{54} = 5 \text{ hours}$$

25. Bhanu takes a total of 6 hours 50 minutes to walk from one place to another and run back to the starting place. He walks on foot on both sides in 8 hours and 30 minutes. Time taken to run on both sides is?

- (a) 5 hours 35 min (b) 5 hours 15 min
(c) 5 hours 10 min (d) 5 hours 45 min

RRB NTPC 17.01.2017 Shift-3

Ans : (c) Let the time taken to cover a distance by running = x

and time taken to cover a distance on foot = y

From question-

$$x + y = 6\frac{5}{6} \text{ h} = \frac{41}{6} \dots\dots(i)$$

and $2y = 8\frac{1}{2} \Rightarrow y = \frac{17}{4}$

From equation (i)-

$$x + \frac{17}{4} = \frac{41}{6} \Rightarrow x = \frac{41}{6} - \frac{17}{4}$$

$$x = \frac{82 - 51}{12} = \frac{31}{12}$$

\therefore Time taken to cover a distance both sides by running

$$= 2 \times \frac{31}{12} = \frac{31}{6} = 5 \text{ hours } 10 \text{ minutes}$$

26. The distance between two points A and B was covered at a speed of 50 km/h in $5\frac{1}{2}$ hours. How much time can be saved if the speed is increased by 5 km/h.

- (a) 5 minutes (b) 15 minutes
(c) 50 minutes (d) 30 minutes

RRB NTPC 03.04.2016 Shift : 1

Ans : (d) Given,

$$S_1 = 50 \text{ km/h}, \quad t_1 = 5\frac{1}{2} = \frac{11}{2} \text{ hours}$$

$$S_2 = (50 + 5) = 55 \text{ km/h}, \quad t_2 = ?$$

$$\text{From formula- } S_1 t_1 = S_2 t_2$$

(Distance = Speed \times Time)

$$50 \times \frac{11}{2} = 55 \times t_2$$

$$t_2 = \frac{275}{55} = 5 \text{ hours}$$

$$\text{Saved time} = \left(\frac{11}{2} - 5 \right) = \frac{1}{2} \text{ hours} \\ = 30 \text{ minutes}$$

27. A bus runs at a speed of 80 km/hr. and reaches its destination with a delay of 10 minutes. If it had moved at a speed of 90 km/hr., it would have reached only 8 minutes late. The right time to complete the journey by bus is:

- (a) 8 minutes (b) 10 minutes
(c) 12 minutes (d) 15 minutes

RRB NTPC 22.04.2016 Shift : 1

Ans : (a) Given-

$$V_1 = 80 \text{ Km./hr.} \quad V_2 = 90 \text{ Km./hr.}$$

$$t_1 = 10 \text{ minutes} \quad t_2 = 8 \text{ minutes}$$

Distance covered by bus from origin to destination

$$= \frac{V_1 \cdot V_2}{V_1 - V_2} \cdot \frac{(t_1 - t_2)}{60}$$

$$= \frac{80 \times 90}{80 - 90} \times \left(\frac{10 - 8}{60} \right)$$

$$= \frac{80 \times 90}{10} \times \frac{2}{60} = 24 \text{ km.}$$

Time taken by bus to complete the journey

$$= \frac{24}{80} \times 60 - 10 = 18 - 10 = 8 \text{ minutes}$$

28. A man at 6:30 am starts walking and wants to travel 30 km. His initial speed is 6 km/h and after traveling $\frac{3}{5}$ of distance he reduced his speed to 2 km/h. He will finish his journey:

- (a) 11.00 am (b) 12.30 pm
(c) 11.30 pm (d) 12.00 pm

RRB NTPC 27.04.2016 Shift : 2

Ans : (b) Given,

Total distance = 30 km.

Distance traveled at a speed of 6 Km./hr.

$$= \frac{3}{5} \text{ of total distance}$$

$$= 30 \times \frac{3}{5}$$

$$= 6 \times 3$$

$$= 18 \text{ km}$$

By 2 Km./hr. reduction in speed $(6 - 2) = 4$ Km./hr.
Hence the last 12 km distance will run at a speed of 4 Km./hr.

Hence time taken to cover the entire distance of 30 km

$$= \frac{18}{6} + \frac{12}{4} = 3 + 3 = 6 \text{ hours}$$

Total time taken by man to finish journey = 6 : 30 + 6 hours

$$= 12:30 \text{ pm}$$

Type - 3

Problems Based on Finding Distance

29. A student walks from his house at 2.5 km/hour and reaches his school 6 minutes after school time. Next day he increases his speed by 1 km/hour and reaches his school 6 minutes before school time. How far is the school from his house ?

- (a) 2.25 km (b) 2.5 km
(c) 1.75 km (d) 2 km

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (c) : Let distance of the school from the house of the student = d km

According to the question,

$$\frac{d}{2.5} - \frac{6}{60} = \frac{d}{(2.5+1)} + \frac{6}{60}$$

$$\frac{d}{2.5} - \frac{d}{3.5} = \frac{1}{10} + \frac{1}{10}$$

$$\frac{d}{2.5 \times 3.5} = \frac{1}{5}$$

$$d = 0.5 \times 3.5$$

$$\therefore d = 1.75 \text{ km}$$

30. Julie can cover a distance of 140 m in 18 second. At that given speed how much distance can Julie cover in 1 hour?

- (a) 25.2 km (b) 31.5 km
(c) 28 km (d) 29.4 km

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (c) : Given,

Time = 18 seconds

Distance = 140 meter

Speed = Distance / Time

$$\text{then, Speed} = \frac{140}{18} \text{ m/sec}$$

$$= \frac{140}{18} \times \frac{18}{5} \text{ km/hour}$$

$$= 28 \text{ km/h.}$$

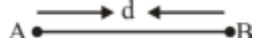
The distance covered by Julie in 1 hour = 28 km.

31. Ravi travels from City A to City B and from City B to City A in 4 hours. If the average speed of the total journey is 68.3 km/h, what is the distance between City A and B ?

- (a) 197.06 km (b) 273.2 km
(c) 152.7 km (d) 136.6 km

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (d) :



$$\text{Average Speed} = \frac{\text{Total distance}}{\text{Total Time}}$$

$$68.3 = \frac{2d}{4}$$

$$d = \frac{68.3 \times 4}{2}$$

$$= 136.6 \text{ km}$$

32. Avik runs at a speed of 8 metres per second. How many kilometres will Avik cover in 24 minutes if he continues running at the same speed?

- (a) 11.44 (b) 11.56
(c) 11.60 (d) 11.52

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (d) : According to the question,

Distance = Speed \times Time

$$= 8 \times 24 \times 60$$

$$= \frac{8 \times 24 \times 60}{1000} \text{ km}$$

$$= 11.52 \text{ km.}$$

33. Ravi has to go from Hyderabad to Delhi. The distance between Hyderabad and Delhi is 1,200 kms. He decides to travel 25% of the distance on foot, 30% of the distance by bus, 15% of the distance by train and the remaining distance by an airplane. What is the distance travelled by Ravi by an Airplane?

- (a) 580 km (b) 360 km
(c) 300 km (d) 425 km

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : According to the question,

Onfoot + Bus + Train + Airplane

$$\begin{array}{ccccccc} \downarrow & \downarrow & \downarrow & \downarrow & & & \\ 25\% & + & 30\% & + & 15\% & + & 30\% = 100\% \end{array}$$

$$\therefore 100\% \rightarrow 1200 \text{ kms.}$$

Distance travelled by Ravi by an Airplane is-

$$\therefore 30\% \rightarrow \frac{1200}{100} \times 30 = 360 \text{ km.}$$

34. Suhas travelled by train to cover $\frac{5}{12}$ of the journey, and then travelled by bus to cover $\frac{1}{3}$ of the journey. After that he travelled the remaining 36 km on a bicycle. How much in all did Suhas travel?

- (a) 132 km (b) 144 km
(c) 150 km (d) 168 km

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (b) : Distance covered by Suhas by train = $\frac{5}{12}$ part

And distance covered by bus = $\frac{1}{3}$ part

Now remaining distance = $1 - \left(\frac{5}{12} + \frac{1}{3}\right) = \frac{3}{12}$ part

According to the question,

$$\frac{3}{12} \text{ unit} \longrightarrow 36 \text{ km}$$

$$1 \text{ unit} \longrightarrow \frac{36 \times 1}{\frac{3}{12}} = \frac{36 \times 12}{3}$$

$$= 12 \times 12 \\ = 144 \text{ km}$$

35. Vaishali covers a certain distance by car at 50 kmph and returns to the original place through the same route on a bicycle at 10 kmph. If the time taken by her for the whole journey was 2 hours 24 minutes, then what was the total distance that she covered?

- (a) 40 km (b) 50 km
(c) 48 km (d) 60 km

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (a) : Let the distance covered by Vaishali in one side be d km.

According to the question,

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\begin{aligned} \frac{d}{50} + \frac{d}{10} &= 2 + \frac{24}{60} \\ &= \frac{d}{50} + \frac{d}{10} = \frac{12}{5} \\ &= \frac{d+5d}{50} = \frac{12}{5} \\ &= \frac{6d}{50} = \frac{12}{5} \end{aligned}$$

$$d = 20 \text{ km}$$

\therefore Total distance = distance covered by car + distance covered by cycle on returning the original place
 $= 20 + 20$
 $= 40 \text{ km}$

36. Two woman walk from a place at the speeds of 6 km/h and 8 km/h respectively. First woman takes 40 min more than the second one to cover the distance. Find the distance.

- (a) 14 km (b) 16 km
(c) 12 km (d) 10 km

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (b) : According to the question,
 $s_1 t_1 = s_2 t_2$ (When distance is equal)

$$6 \times \left(t + \frac{40}{60}\right) = 8 \times t$$

$$3 \left(t + \frac{2}{3}\right) = 4t$$

$$3t + 2 = 4t$$

$$t = 2 \text{ h}$$

$$\therefore \text{Distance} = s_2 t_2 = 8 \times 2 \\ = 16 \text{ km}$$

37. A man travels 360 km in 4h, partly by air and partly by train. If he had travelled all the way by air, he would have saved $\frac{4}{5}$ of the time he travelled by train, and he would have arrived at his destination 2 h early. Find the distance he travelled by air.

- (a) 260 km (b) 290 km
(c) 270 km (d) 280 km

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (c) : $\frac{4}{5}$ of the total time taken by train = 2 hours

$$\text{Total time taken by the train} = \frac{5}{4} \times 2 = \frac{5}{2} \text{ hours}$$

Total time to cover a certain distance of 360 km in 4 hours

$$4 - \frac{5}{2} = \frac{8-5}{2} = \frac{3}{2} \text{ hours}$$

Time taken by air to cover a distance of 360 km = 2 hours

$$\therefore \text{Distance covered in } \frac{3}{2} \text{ hours} = \frac{360}{2} \times \frac{3}{2} = 90 \times 3 \\ = 270 \text{ km}$$

Hence the total distance travelled by air = 270 km

38. Two cars cover a certain distance by moving at speeds of 45 km/h and 50 km/h respectively. Find the distance travelled when one car takes 32 minutes more than the other to cover the distance?

- (a) 240 km (b) $\frac{240}{19}$ km
(c) $\frac{8}{3}$ km (d) $\frac{152}{3}$ km

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (a) : Let distance covered = d km

According to the question,

$$\frac{d}{45} - \frac{d}{50} = \frac{32}{60}$$

$$\frac{d}{9} - \frac{d}{10} = \frac{32}{12}$$

$$\frac{10d - 9d}{90} = \frac{32}{12}$$

$$\frac{d}{90} = \frac{32}{12}$$

$$d = \frac{90 \times 32}{12} = 240 \text{ km}$$

39. A man travelled from a village to a postoffice at a speed of 25 km/h and walked back at a speed of 4 km/h. If the whole journey took 5 hours 48 minutes, then find the distance of the post office from the village.

(a) 20 m (b) 20 km
(c) 40 m (d) 40 km

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let distance of the post office from the village = x km

According to the question,

$$\frac{x}{25} + \frac{x}{4} = 5 \text{ hours } 48 \text{ minutes}$$

$$\frac{4x+25x}{100} = 5\frac{4}{5}$$

$$\frac{29x}{100} = \frac{29}{5}$$

$$x = 20 \text{ km}$$

40. A man travelled a distance of 61 km in 9 h. He travelled partly on foot at the speed of 4 km/h and partly on bicycle at the speed of 9 km/h. What was the distance travelled on Foot?

(a) 12 km (b) 16 km
(c) 18 km (d) 14 km

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let distance travelled x km on foot.

According to the question,

$$9 = \frac{x}{4} + \frac{61-x}{9}$$

$$9 = \frac{9x + 4(61-x)}{36}$$

$$9 \times 36 = 9x + 244 - 4x$$

$$324 = 5x + 244$$

$$5x = 80 \Rightarrow x = 16 \text{ km}$$

41. Driving his car at the speed of 30 km/h Vinod reaches his office 5 min late. If his speed is 40 km/h, he reaches the office 3 min early. Find the distance he travels between his residence and his office.

(a) 20 km (b) 15 km
(c) 18 km (d) 16 km

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (d) : When distance is constant

Distance = Speed \times Time

$$s_1 t_1 = s_2 t_2$$

$$30 \left(t + \frac{5}{60} \right) = 40 \left(t - \frac{3}{60} \right)$$

$$3t + \frac{15}{60} = 4t - \frac{12}{60}$$

$$\frac{15}{60} + \frac{12}{60} = 4t - 3t$$

$$t = \frac{27}{60}$$

Putting the value of t

$$= 30 \left(t + \frac{5}{60} \right)$$

$$= 30 \left(\frac{27}{60} + \frac{5}{60} \right) = 30 \times \frac{32}{60} = 16 \text{ km}$$

42. Two men start walking together to a certain destination, one at the speed of 3 km/h and another at the speed of 3.75 km/h. The latter arrives half an hour before the former. The distance is:

(a) 7.0 km (b) 6.7 m
(c) 0.7 km (d) 7.5 km

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let us consider the distance of destination is d km.

As per the question

$$\frac{d}{3} - \frac{d}{3.75} = \frac{1}{2}$$

$$\frac{.75d}{3 \times 3.75} = \frac{1}{2}$$

$$d = \frac{15}{2}$$

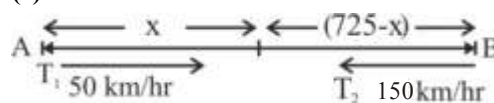
$$d = 7.5 \text{ km}$$

43. A train leaves station A towards station B at the speed of 50 km/hr. After half an hour, another train leaves station B towards station A at 150 km/hr. The distance between the stations is 725 km. The distance of the point from station A where the two trains are to meet is:

(a) 168 km (b) 250 km
(c) 200 km (d) 150 km

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (c) :



Distance of meeting point from 'A' = x km

Distance covered by the first train in 30 min = 25 km

Remaining distance = 725 - 25 = 700 km

Relative speed = (50 + 150) km/h

$$= 200 \text{ km/hr}$$

$$\text{Meeting time} = \frac{700}{200} \text{ hours}$$

$$= 3.5 \text{ hours}$$

Distance covered by the first train in 3.5 hours

$$= 50 \times \frac{7}{2} \text{ km}$$

$$175 \text{ km}$$

Hence, distance from station A where the two trains meet = 175 + 25 = 200 km

44. Ram covers a certain distance on a toy train. Had the train moved 8 km/h faster, it would have taken 20 min less. If it had moved 4 km/h slower, it would have taken 40 min more. Find the distance.

- (a) $\frac{16}{3}$ km (b) $\frac{17}{3}$ km
(c) $\frac{20}{3}$ km (d) $\frac{19}{3}$ km

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (a) : Let the distance = n km

If speed of train v km/h and time be t hour.

$$\therefore (v + 8) \left(t - \frac{1}{3} \right) = n$$

$$(v - 4) \left(t + \frac{2}{3} \right) = n$$

When distance is constant

$$s_1 t_1 = s_2 t_2$$

$$(v + 8) \left(t - \frac{1}{3} \right) = (v - 4) \left(t + \frac{2}{3} \right)$$

$$-v/3 + 8t - 8/3 = 2v/3 - 4t - 8/3$$

$$v = 12t$$

$$t = \frac{v}{12} \text{----- (i)}$$

$$\frac{n}{v-4} - \frac{n}{v+8} = 1$$

$$12n = v^2 + 4v - 32$$

$$12vt = v^2 + 4v - 32 \quad \{ \therefore n = v \times t \}$$

$$v^2 = v^2 + 4v - 32 \quad \left\{ \therefore t = \frac{v}{12} \right\}$$

$$v = 8 \text{ km}$$

Hence, distance (n) = v × t

$$n = 8 \times \frac{8}{12} = \frac{16}{3} \text{ km}$$

45. Vishnu covers the same distance at a speed of 10 km/h, 30 km/h and 8 km/h and takes a total of 15.5 minutes to complete journey, then find the total distance travelled by him.

- (a) 1 (b) 3
(c) 4 (d) 2

RRB NTPC 17.01.2017 Shift-I

Ans : (b) Let total distance covered by Vishnu is x km.

According to the question,

$$\frac{\left(\frac{x}{3}\right)}{10} + \frac{\left(\frac{x}{3}\right)}{30} + \frac{\left(\frac{x}{3}\right)}{8} = \frac{15.5}{60}$$

$$\frac{x}{3} \left(\frac{1}{10} + \frac{1}{30} + \frac{1}{8} \right) = \frac{15.5}{60}$$

$$\frac{x}{3} \left(\frac{24 + 8 + 30}{240} \right) = \frac{15.5}{60}$$

$$\frac{x}{3} \left(\frac{62}{240} \right) = \frac{15.5}{60}$$

$$x = \frac{15.5 \times 240 \times 3}{60 \times 62}$$

$$x = \frac{186}{62}$$

$$x = 3 \text{ km.}$$

46. If Lalita leaves for her school from her home at a speed of 45 km/h by car then she takes 5 minutes more than driving at 60 km/h. What is the distance between home and school?

- (a) 18km (b) 15km
(c) 14km (d) 10km

RRB NTPC 18.01.2017 Shift : 2

Ans : (b) Let the distance of school from home = x km. then, the time taken by Lalita to cover the distance of x

$$\text{km at the speed of 45 Km./hr.} = \frac{x}{45}$$

$$\text{Time taken by Lalita to cover the distance of x km at the speed of 60 Km./hr.} = \frac{x}{60}$$

According to the question,

$$\frac{x}{45} - \frac{x}{60} = \frac{5}{60}$$

$$\frac{4x - 3x}{180} = \frac{1}{12}$$

$$x = \frac{180}{12} = 15$$

$$\boxed{x = 15 \text{ km}}$$

Distance between school and home = 15 km

47. Ram completes the $\frac{4}{9}$ th part of the total journey by Bus, the $\frac{5}{18}$ th part by train and the remaining 10 km by walking. Find the total distance.

- (a) 42 km. (b) 90 km.
(c) 36 km. (d) 18 km.

RRB NTPC 19.04.2016 Shift : 2

Ans : (c) Let the total distance is x km.

$$\text{Distance travelled by bus} = \frac{4x}{9}$$

$$\text{Distance travelled by train} = \frac{5x}{18}$$

According to the question,

$$x - \left(\frac{4x}{9} + \frac{5x}{18} \right) = 10$$

$$x - \frac{13x}{18} = 10$$

$$\frac{5x}{18} = 10$$

$$5x = 10 \times 18$$

$$x = \frac{10 \times 18}{5} = 36 \text{ km.}$$

48. Mohan covers a certain distance from his car in 12 hours at a uniform speed. When the speed is increased by 5 km/h, then the same distance can be covered in 9 hours. What is the total distance?
- (a) 108 km. (b) 90 km.
(c) 190 km. (d) 180 km.

RRB NTPC 18.04.2016 Shift : 3

Ans : (d) Let the total distance is d km and the speed is 'V' km/h-

According to first condition-

$$V = \frac{d}{12} \dots\dots(i)$$

According to the second condition-

$$(V + 5) = \frac{d}{9} \dots\dots(ii)$$

From equation (i) and (ii)-

$$\frac{d}{12} + 5 = \frac{d}{9}$$

$$\frac{d + 60}{12} = \frac{d}{9}$$

$$3d + 180 = 4d$$

$$d = 180 \text{ km.}$$

49. Chandan covers equal distances at the speed of 3 km/h, 4 km/h and 8 km/h respectively and takes a total time of 42.5 minutes. Find the total distance in km.
- (a) 4 (b) 2
(c) 1 (d) 3

RRB NTPC 11.04.2016 Shift : 2

Ans : (d) Time (t) = 42.5 minutes = $\frac{42.5}{60}$ hours.

Let distance = d, $d = d_1 + d_2 + d_3$

and $d_1 = d_2 = d_3 = x$

Average speed = V

$V_1 = 3 \text{ Km./hr.}$ $V_2 = 4 \text{ km/ hr.}$ $V_3 = 8 \text{ Km./hr.}$

$$\text{Average speed} = (V) = \frac{d_1 + d_2 + d_3}{\frac{d_1}{V_1} + \frac{d_2}{V_2} + \frac{d_3}{V_3}}$$

$$V = \frac{x + x + x}{\frac{x}{3} + \frac{x}{4} + \frac{x}{8}}$$

$$V = \frac{3x}{\frac{8x + 6x + 3x}{24}}$$

$$V = \frac{3x}{\frac{17x}{24}}$$

$$V = \frac{3 \times 24}{17} \text{ km/hr.}$$

Then,

Distance = speed \times time

$$d = \frac{42.5}{60} \times \frac{3 \times 24}{17}$$

$$d = \frac{425}{600} \times \frac{3 \times 24}{17}$$

$$d = 3 \text{ km}$$

50. Monal Kumar travels the same distance at the speed of 3 km/h, 5 km/h and 8 km/h respectively and takes a total time of 395 minutes. Find the total distance in km.

- (a) 40 (b) 20
(c) 10 (d) 30

RRB NTPC 22.04.2016 Shift : 2

Ans : (d) Let the total distance is 3d km.

According to the question,

$$\frac{d}{3} + \frac{d}{5} + \frac{d}{8} = \frac{395}{60}$$

$$\frac{40d + 24d + 15d}{120} = \frac{395}{60}$$

$$\frac{79d}{120} = \frac{395}{60}$$

$$d = 10$$

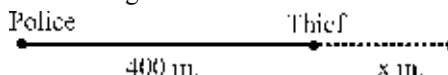
Hence total distance = 3d = 3 \times 10 = 30 km.

51. A thief is 400 meters ahead of a policeman. The thief runs away and policeman starts chasing together. Suppose the speed of the thief is 10 km/h and the speed of the police is 15 km/h. Calculate the distance the thief covered before the policeman caught.

- (a) 750 meter (b) 800 meter
(c) 850 meter (d) 900 meter

RRB NTPC 29.04.2016 Shift : 2

Ans : (b) Let the thief covered a distance of x m before the policeman caught.



According to the question,

$$\frac{x + 400}{15 \times \frac{5}{18}} = \frac{x}{10 \times \frac{5}{18}}$$

$$\frac{6x + 2400}{25} = \frac{9x}{25}$$

$$3x = 2400$$

$$x = 800 \text{ m}$$

Type - 4

Problems Based on Average Speed

52. A car covers a certain distance at a speed of 45 km/h and returns to the starting point following the same path at a speed of 36 km/h. Find the average speed for the entire journey (in km/h).

- (a) 42 (b) 38
(c) 40 (d) 35

RRB NTPC (Stage-II) 15/06/2022 (Shift-II)

Ans. (c) : According to the question,

We know that-

\therefore Average speed = $\frac{2ab}{a+b}$ Where (a and b = speeds of car)

$$\begin{aligned}\text{Average speed of car} &= \frac{2 \times 45 \times 36}{45 + 36} \\ &= \frac{2 \times 45 \times 36}{81} = 40 \text{ km/h}\end{aligned}$$

53. A bus covers four successive 12 km stretches at 20 kmph, 40 kmph, 60 kmph and 120 kmph respectively. Its average speed (in kmph) is :

- (a) 40 (b) 50
(c) $\frac{200}{9}$ (d) $\frac{100}{9}$

RRB NTPC (Stage-II) –16/06/2022 (Shift-I)

Ans. (a) : Average Speed = $\frac{\text{Total Distance}}{\text{Total Time}}$

$$\begin{aligned}&= \frac{12+12+12+12}{\frac{12}{20} + \frac{12}{40} + \frac{12}{60} + \frac{12}{120}} = \frac{48}{0.6+0.3+0.2+0.1} \\ &= \frac{48}{1.2} = 40 \text{ km/h}\end{aligned}$$

54. Rohan had to travel from A to B. He covers 75% of the distance at a speed of 60 km/h and the remaining distance at a speed of 40 km/h. What was his average speed for the entire journey?

- (a) 55 km/h (b) $53\frac{1}{3}$ km/h
(c) 50 km/h (d) $54\frac{2}{3}$ km/h

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let the total distance be x km.

$$\text{Distance covered at 60 km/h} = \frac{75}{100} \times x = \frac{3}{4}x$$

$$\text{Distance covered at 40 km/h} = \frac{1}{4}x$$

$$\begin{aligned}\text{Average speed} &= \frac{\text{Total distance}}{\text{Total Time}} = \frac{x}{\frac{3}{4}x \times \frac{1}{60} + \frac{1}{4}x \times \frac{1}{40}} \\ &= \frac{x}{\frac{3x}{160} + \frac{x}{160}} \\ &= \frac{160}{4} = 53\frac{1}{3} \text{ km/h}\end{aligned}$$

55. A man travels a distance of 30 km at a speed of 6 km/h and completes the remaining distance 40 km in 5 hours. Find his average speed during the whole journey:

- (a) 7 km/hr (b) 8 km/hr
(c) $6\frac{4}{11}$ km/hr (d) 5 km/hr

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (a) : Time taken by man to cover a distance of 30 km at a speed of 6 km/h = $\frac{30}{6} = 5$ hours

$$\begin{aligned}\text{Average speed} &= \frac{\text{Total distance}}{\text{Total time}} \\ &= \frac{30+40}{5+5} \\ &= \frac{70}{10} \\ &= 7 \text{ km/hr.}\end{aligned}$$

56. A man rides his bicycle for 10 km at an average speed of 12 km/h and further travels 12 km at an average speed of 10 km/h. What is his approximate average speed for the entire trip?

- (a) 8 km/h (b) 8.19 km/h
(c) 10.8 km/h (d) 8.10 km/h

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (c) : Time taken to cover a distance of 10 km with a speed of 12 km/h = $\frac{10}{12}$ h

Time taken to cover a distance of 12 km with a speed of 10 km/h = $\frac{12}{10}$ h

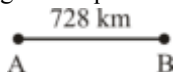
$$\begin{aligned}\text{Average speed} &= \frac{\text{Total distance}}{\text{Total time}} \\ &= \frac{10+12}{\frac{10}{12} + \frac{12}{10}} \\ &= \frac{22}{\frac{100+144}{120}} \\ &= \frac{22}{244/120} \\ &= \frac{22}{244} \times 120 \\ &= 10.8196 \\ &= 10.8 \text{ km/h (Approx)}\end{aligned}$$

57. Suhas can cover the distance between point A and point B in 7 hours, if he travels at an average speed of 104 km/h. He travelled for the first four hours at an average speed of 118 km/h. What should be his average speed for the rest of the journey, if he wants to reach his destination in a total time of 8 hours from the start of the journey?

- (a) 72 km/h (b) 60 km/h
(c) 70 km/h (d) 64 km/h

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,



The total distance between A and B can be covered by Suhas in 7 hours = $104 \times 7 = 728$ km

Distance covered in first 4 hours = $118 \times 4 = 472$ km

Remaining distance = $728 - 472 = 256$ km

Average speed in last 4 hours = $\frac{256}{4} = 64$ km/h

58. An aeroplane flies along the sides of an equilateral triangle at the speed of 300 km/h, 200 km/h and 240 km/h, respectively. The average speed of the plane while flying around the triangle is:

- (a) 240 km/h (b) 150 km/h
(c) 140 km/h (d) 40 km/h

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the length of the side of equilateral triangle = x km.

\therefore Time taken to cover a distance of x k.m at a speed of 300 km/hr.

$$(t_1) = \frac{x}{300} \text{ hours}$$

Similarly,

$$t_2 = \frac{x}{200}$$

$$t_3 = \frac{x}{240}$$

So,

$$t_1 + t_2 + t_3 = \frac{x}{300} + \frac{x}{200} + \frac{x}{240}$$

$$= \frac{4x + 6x + 5x}{1200} = \frac{15x}{1200}$$

$$\text{Average speed} = \frac{\text{Total Distance}}{\text{Total time}}$$

$$= \frac{3x}{t_1 + t_2 + t_3}$$

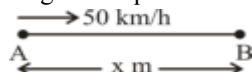
$$= \frac{3x}{\frac{15x}{1200}} = \frac{3600}{15} = 240 \text{ km/h.}$$

59. If a man travels from A to B at a speed of 50 km/h and returns by increasing his speed by 40%, then find his average speed up (to 2 decimal places) for both the trips:

- (a) 62.35 km/h (b) 58.33 km/h
(c) 55.34 km/h (d) 47.28 km/h

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question-



Speed for returning trip = $50 + 50 \times \frac{40}{100} = 70$ km/h

$$t_{A \rightarrow B} = \frac{x}{50} h$$

$$t_{B \rightarrow A} = \frac{x}{70} h$$

$$\text{Total time} = \frac{x}{50} + \frac{x}{70} = \frac{7x + 5x}{350} = \frac{12x}{350} = \frac{6x}{175}$$

$$\text{Average speed} = \frac{2x}{6x/175}$$

$$= \frac{2x}{1} \times \frac{175}{6x} = 58.33 \text{ km/h}$$

60. A car travels at a speed of 62 km/h for $2\frac{1}{2}$ hours and 68 km/h for $1\frac{1}{4}$ hours. What will be its average speed in total distance travelled?

- (a) 65 (b) 64
(c) 63 (d) 61

RRB NTPC 28.04.2016 Shift : 1

Ans : (b) Total distance covered by car

$$= 62 \times \frac{5}{2} + 68 \times \frac{5}{4} \quad (\because \text{Distance} = \text{Speed} \times \text{Time})$$

$$= 31 \times 5 + 17 \times 5$$

$$= 155 + 85 = 240 \text{ km.}$$

$$\text{Average speed of car} = \frac{\text{Total Distance}}{\text{Total Time}}$$

$$= \frac{240}{5/2 + 5/4} \Rightarrow \frac{240 \times 4}{10 + 5}$$

$$= \frac{240 \times 4}{15} \Rightarrow 16 \times 4 = 64 \text{ km/hr.}$$

61. The speed of a car from A to B is 60 km/h and the speed of return is 40 km/h. Find the average speed of the car (in km/h).

- (a) 50 (b) 45
(c) 48 (d) 52

RRB NTPC 12.04.2016 Shift : 1

Ans : (c) According to the question,

$$V_1 = 60 \text{ Km./hr.}$$



$$V_2 = 40 \text{ Km./hr.}$$

$$\text{Average speed of car} = \frac{2V_1V_2}{V_1 + V_2}$$

$$= \frac{2 \times 60 \times 40}{60 + 40} = \frac{4800}{100} = 48 \text{ Km./hr.}$$

62. P moves at a speed of 50 km/h in the first 1 hour and at a speed of 70 km/h in the next two hours. What is the average speed of P?

- (a) 60 km/hr (b) 63.33 km/hr.
(c) 59.33 km/hr. (d) 62 km/hr.

RRB NTPC 02.04.2016 Shift : 1

Ans : (b) Distance covered by P in first hour = 50 km.

Distance covered by P in second hour = 70

Distance covered by P in third hour = 70 km.

$$\therefore \text{Average speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

$$= \frac{50 + 70 + 70}{1 + 1 + 1} = \frac{190}{3} = 63.33 \text{ Km./hr.}$$

- 63. A cyclist travels a distance of 8 km at the speed of 15 km/h and a distance of 4 km at a speed of 20 km/h. Then what will be his average speed?**

- (a) 16.8 (b) 16.36
(c) 15.71 (d) 17.50

RRB NTPC 28.03.2016 Shift : 2

Ans : (b) If a person walks A km distance at a speed of x km/hr. and B km distance at a speed of y km/hr. then

$$\text{Average speed} = \frac{A + B}{\frac{A}{x} + \frac{B}{y}} = \frac{8 + 4}{\frac{8}{15} + \frac{4}{20}} = \frac{12}{\frac{8}{15} + \frac{1}{5}}$$

$$= \frac{12}{\frac{8 + 3}{3}} = \frac{12 \times 15}{11} = 16.36 \text{ km/hr}$$

- 64. A person covers the first 176 km at a speed of 16 km/h and the next 64 km at a speed of 32 km/h. What would be the approximate average speed for the first 240 km of the journey?**

- (a) 13 km./hr. (b) 27 km./hr.
(c) 18.5 km./hr. (d) 21 km./hr.

RRB NTPC 19.04.2016 Shift : 3

Ans : (c) Time taken by a person to travel 176 km.
distance = $\frac{176}{16} = 11$ hours

Time taken by a person to travel 64 km. distance

$$= \frac{64}{32} = 2 \text{ hrs.}$$

$$\text{Average speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

$$= \frac{176 + 64}{11 + 2} = \frac{240}{13}$$

$$= 18.5 \text{ Km./hr. (almost)}$$

- 65. A runner covers a distance of 60 km in 3 hours and 45 minutes. How much should he increase the average speed to cover this distance 45 minutes before?**

- (a) 16 Km./hr. (b) 20 Km./hr.
(c) 6 Km./hr. (d) 4 Km./hr.

RRB NTPC 18.04.2016 Shift : 3

Ans : (d) Given—

Distance = 60 km, Time = 3 hours 45 minutes

$$= 3 \frac{45}{60} \text{ hours}$$

$$= \frac{15}{4} \text{ hours}$$

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{60}{(15/4)} = 60 \times \frac{4}{15} = 16 \text{ Km./hr.}$$

Let the average speed be increased by x Km./hr.

Time = 3 hours

Speed = (16+x) Km./hr.

According to the question,

$$(16 + x) = \frac{60}{3}$$

$$16 + x = 20$$

$$x = 20 - 16$$

$$x = 4 \text{ Km./hr.}$$

- 66. Car P travels a certain distance in 11 hours at a speed of 66 km/h. Car Q travels a distance of 242 km more than car P in the same time. Find the average speed of car Q.**

- (a) 718 Km./hr. (b) 77 Km./hr.
(c) 88 Km./hr. (d) 83 Km./hr.

RRB NTPC 19.01.2017 Shift : 2

Ans : (c) Distance covered by car P = $66 \times 11 = 726$ km

$$\text{Average speed of Q} = \frac{\text{Total distance}}{\text{Total time}}$$

$$\text{Average speed of Q} = \frac{726 + 242}{11} = \frac{968}{11} = 88$$

$$\text{Average speed of Q} = 88 \text{ Km./hr.}$$

Type - 5

Problem Based on The Ratio of Speed, Time and Distance

- 67. A certain distance (d) is covered by a cyclist at a certain speed. If a jogger covers half the distance in double the time (t), then the ratio of speed of the cyclist to the speed of the jogger is:**

- (a) 3 : 1 (b) 2 : 1
(c) 4 : 1 (d) 1 : 2

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the speed of the cyclist is v_1 and the speed of the jogger is v_2 .

According to the question,

$$v_1 = \frac{d}{t} \dots \dots \dots \text{(i)}$$

$$v_2 = \frac{d/2}{2t} = \frac{d}{4t} \dots \dots \dots \text{(ii)}$$

From eqⁿ (i) and (ii)

$$\frac{v_1}{v_2} = \frac{d/t}{d/4t}$$

$$\frac{v_1}{v_2} = \frac{4t \times d}{d \times t}$$

$$\frac{v_1}{v_2} = \frac{4}{1}$$

$$v_1 : v_2 = 4 : 1$$

Required ratio = 4 : 1

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68. Car I travels a certain distance in a certain time. Car II travels half of the distance in double the time. Find the ratio of their relative speeds.

- (a) 1 : 2 (b) 1 : 4
(c) 2 : 1 (d) 4 : 1

RRB NTPC 17.01.2017 Shift-2

Ans : (d) Let the distance is d and time is t.

According to the question,

$$\text{Speed for car I } (S_1) = \frac{d}{t}$$

$$\text{Speed for car II } (S_2) = \frac{d/2}{2t} = \frac{d}{4t}$$

$$\therefore S_1 : S_2 = \frac{d}{t} : \frac{d}{4t} = 1 : \frac{1}{4} = 4 : 1$$

69. Two stations Mumbai and Pune which have a distance of 300 km. Two buses run opposite directions from Mumbai and Pune respectively and cross each other at a distance of 220 km from a station. What is the ratio of their speed?

- (a) 13:9 (b) 10:3
(c) 11:4 (d) 14:5

RRB NTPC 12.04.2016 Shift : 2

Ans : (c) Total distance = 300 km

Distance from first station = 220 km

Distance from second station = 300 - 220 = 80 km

Ratio of speed = 220 : 80 = 11 : 4

Type - 6 Miscellaneous

70. A student takes 1.5 hours from home to school at a speed of 5 km/h. By what percent should he increases his speed to reduce the time by 20% and covers the same distance from school to home?

- (a) 20 % (b) 25 %
(c) 16 % (d) 15 %

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the speed is increased by 'v' km/h.

$$\text{From, } v_1 t_1 = v_2 t_2$$

$$5 \times 1.5 = (5+v) \times 1.2 \quad (\because 1.5 \times \frac{80}{100} = 1.2h)$$

$$25 = 20 + 4v$$

$$v = \frac{5}{4} \text{ km/h}$$

$$\text{Hence, percentage increase in the speed} = \frac{\frac{5}{4}}{5} \times 100$$

$$= \frac{5}{20} \times 100$$

$$= 25\%$$

71. Parvez leaves his office every day at 6 pm and reaches home at 7.30 pm. One day he left his office at 6 pm but he covered one fourth the distance at 4/5 of his usual speed if Parvez was able to reach home on time then at what time did he cover the remaining part of the journey at his usual speed?

- (a) $\frac{16}{15}$ (b) $\frac{10}{9}$
(c) $\frac{12}{11}$ (d) $\frac{6}{5}$

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (c) : Let distance between office and Parvez's home is d km and his usual speed be v km/h.

According to the question,

$$\frac{d}{v} = 1\frac{1}{2} \text{ hours}$$

$$\frac{d}{v} = 3\frac{1}{2} \text{ hours} \quad \text{--- (i)}$$

Again, let Parvez covers the remaining part of the journey at x times of usual speed.

$$\frac{(d/4)}{(4v/5)} + \frac{(3d/4)}{x.v} = 3/2 \quad \text{--- (ii)}$$

From eqⁿ (i) & (ii),

$$\frac{(d/4)}{(4v/5)} + \frac{(3d/4)}{x.v} = \frac{d}{v}$$

$$\Rightarrow \frac{5}{16} + \frac{3}{4x} = 1$$

$$\Rightarrow \frac{3}{4x} = 1 - \frac{5}{16} \text{ or } \frac{3}{4x} = \frac{11}{16}$$

$$\frac{3}{x} = \frac{11}{4}$$

$$\frac{1}{x} = \frac{11}{12}$$

$$x = \frac{12}{11}$$

Type - 1 Simple Problems Related to Train

1. A train is moving with the speed of 90 km/h. How many meters will it cover in 15 min?

- (a) 23500 (b) 24500
(c) 21500 (d) 22500

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given Speed of train = 90 km/h

$$= 90 \times \frac{5}{18} = 25 \text{ m/sec}$$

$$\text{Time} = 15 \text{ min} = 15 \times 60 = 900 \text{ sec}$$

$$\text{So, require distance} = 25 \times 900 \\ = 22500 \text{ meters}$$

2. A train is travelling at a speed of 45 km/hr. Calculate the distance that will be covered by the train in 64 seconds.

- (a) 0.8 km (b) 4 km
(c) 2.94 km (d) 8 km

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (a) : Given, Speed of the train = 45 km/hr

$$\text{Time} = \frac{64}{3600} \text{ hr}$$

$$= \frac{4}{225} \text{ hr}$$

$$\text{So, require distance} = \text{Speed} \times \text{Time}$$

$$= 45 \times \frac{4}{225}$$

$$= \frac{3 \times 4}{15} = 0.8 \text{ km}$$

3. A train covers a distance of 35 km in 60 min. How long will it take to cover 105 km?

- (a) 180 min (b) 120 min
(c) 140 min (d) 90 min

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (a) :

\therefore The train covers a distance of 35 km in 60 minutes.

\therefore The train will cover a distance of 1 km = $\frac{60}{35}$ minutes

\therefore Time taken by train to cover a distance of 105 km

$$= \frac{60}{35} \times 105 = 180 \text{ minutes}$$

4. A train is moving at a speed of 180 km/h. Its speed expressed in m/s is:

- (a) 50 m/s (b) 40 m/s
(c) 30 m/s (d) 5 m/s

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,

$$\text{Speed of } 180 \text{ km/h} = 180 \times \frac{5}{18} \text{ m/sec.} \\ = 50 \text{ m/sec.}$$

5. The ratio between the speeds of two trains is 7:5. If the second train runs 400 km in 4 h, then the speed of the first train is:

- (a) 142 km/h (b) 145 km/h
(c) 148 km/h (d) 140 km/h

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (d) : Given,

$$\text{Speed of second train} = \frac{400}{4} = 100 \text{ km/h}$$

$$\therefore \text{Ratio of speed of both trains} = 7:5$$

$$\text{So, } 5 \text{ unit} = 100$$

$$\therefore 1 \text{ unit} = \frac{100}{5} = 20$$

$$\therefore \text{Speed of first train} = 7 \text{ unit} = 7 \times 20 = 140 \text{ km/h}$$

6. A train is travelling at a uniform speed of 75 km/h. How far will it travel in 20 minutes?

- (a) 20 km (b) 40 km
(c) 4 km (d) 25 km

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$\text{Speed} = 75 \text{ km/h}$$

$$\text{Time} = 20 \text{ min.}$$

$$= \frac{20}{60} \text{ hr}$$

$$\text{So, require distance} = \text{Speed} \times \text{Time}$$

$$= 75 \times \frac{20}{60}$$

$$\therefore \boxed{\text{Distance} = 25 \text{ km.}}$$

7. A train is moving at a uniform speed of 75 km/h. Find the time required by the train to cover a distance of 250 km.

- (a) 2 h (b) 3 h 5 min
(c) 3 h (d) 3 h 20 min

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (d) : Given, Speed = 75 km/h, Distance = 250 km

$$\begin{aligned}\therefore \text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ 75 &= \frac{250}{T} \\ T &= \frac{250}{75} \\ T &= \frac{10}{3} \text{ h.}\end{aligned}$$

Hence, Time = 3 h 20 min.

8. A train covers 400 km at a uniform speed. If the speed had been 10 km/h more, it would have taken 2 h less for the same journey. find the speed of the train

- (a) 45 km/h (b) 40 km/h
(c) 55 km/h (d) 50 km/h

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let Speed of train is x km/h

According to the question,

$$\frac{400}{x} - \frac{400}{x+10} = 2$$

$$\frac{x+10-x}{x(x+10)} = \frac{1}{200}$$

$$x^2 + 10x = 2000$$

$$x^2 + 10x - 2000 = 0$$

$$x^2 + 50x - 40x - 2000 = 0$$

$$x(x+50) - 40(x+50) = 0$$

$$(x+50)(x-40) = 0$$

$$x - 40 = 0$$

$$x = 40$$

Hence speed of train = 40 km/h

9. A bullet train covers a certain distance in 5 hours at a speed of 240 km/hr. To cover the same distance in 2 hours what should be its speed (km/hr)?

- (a) 420 (b) 540
(c) 480 (d) 600

RRB NTPC 30.04.2016 Shift : 1

Ans : (d) Since, Distance = Speed \times Time

$$= 240 \times 5 = 1200 \text{ km.}$$

$$\text{So, Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{1200}{2} = 600 \text{ km/hr.}$$

10. Ratio of the speeds of two trains is 4:5. If the second train covers 800 km in 8 hours then what is the speed of the first train?

- (a) 95 km/hr (b) 85 km/hr
(c) 75 km/hr (d) 80 km/hr

RRB NTPC 18.01.2017 Shift : 3

Ans : (d) Let the speed of first and second train is 4x, 5x km/h respectively.

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$5x = \frac{800}{8}$$

$$5x = 100$$

$$x = 20$$

Hence speed of first train = 4x = 4 \times 20 = 80 km/h

Type - 2

When The Train Crosses a Person or a Pole

11. A train travelling at 72 km/h crosses a post in 12 seconds. What is the length of the train?

- (a) 180 m (b) 225 m
(c) 200 m (d) 240 m

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (d) : According to the question,

$$\begin{aligned}\text{Length of the train} &= 72 \times \frac{5}{18} \times 12 \\ &= 240 \text{ m}\end{aligned}$$

12. A train running at the speed of 95 km/h crosses a pole in 18 seconds. What is the length of the train in metres?

- (a) 475 m (b) 480 m
(c) 465 m (d) 455 m

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : Given,

Speed of Train = 95 km/h

Time = 18 seconds

Length (m.) = ?

Then,

Speed = Distance / Time

$$95 \times \frac{5}{18} = \frac{\text{Distance}}{18}$$

$$\begin{aligned}\text{Distance} &= 95 \times 5 \\ &= 475 \text{ m}\end{aligned}$$

13. At a speed of 60 km/h a train crosses a pole in 33 s. Find the length of the train.

- (a) 550 m (b) 490 m
(c) 400 m (d) 495 m

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (a) : Given, Speed of Train = 60 km/h

$$= \frac{60 \times 1000}{60 \times 60} = \frac{50}{3} \text{ m/s}$$

$$\therefore \text{Distance covered by train in 1 second} = \frac{50}{3} \text{ m.}$$

$$\therefore \text{Distance covered by train in 33 seconds}$$

$$= \frac{50}{3} \times 33 = 550 \text{ m.}$$

Hence, length of train = 550 m.

14. A 300 m long train crosses an electric pole in 5 s. Find the speed of the train.

- (a) 200 km/h (b) 220 km/h
(c) 216 km/h (d) 218 km/h

RRB NTPC 28.01.2021 (Shift-I) Stage I

Ans. (c) : Given,

Length of train (d) 300 m = 0.3 km

$$\text{Time (T)} = 5 \text{ sec} = \frac{5}{60 \times 60} \text{ h.}$$

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{(0.3)}{\left(\frac{5}{60 \times 60}\right)} = \frac{3 \times 60 \times 60}{10 \times 5}$$

$$= 3 \times 12 \times 6$$

$$= 216 \text{ km/h}$$

15. A 180 m long train is running at a speed of 90 km/h. How long will it take to pass a post?

- (a) 5.5 s (b) 7.8 s
(c) 7 s (d) 7.2 s

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (d) : The time taken by the train to cross the post –

$$= \frac{180}{90 \times \frac{5}{18}}$$

$$= \frac{180}{25} = 7.2 \text{ seconds}$$

16. A train having a speed of 60 km/h crosses a pole in 1.5 min. Find the length of the train (in m).

- (a) 1500 (b) 600
(c) 1200 (d) 800

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (a) : Let the length of train = ℓ m.

According to the question,

$$\frac{\ell}{60} = \frac{1.5}{60}$$

$$\ell = 1.5 \text{ km}$$

$$\ell = 1500 \text{ m.}$$

17. A 150 metre long train is moving with a speed of 54 km/hr. Find the time taken by the train to cross a pole?

- (a) 8 second (b) 10 second
(c) 12 second (d) 15 second

RRB NTPC 31.03.2016 Shift : 3

Ans : (b) Given, Speed of train = 54 km/h

$$= 54 \times \frac{5}{18} = 15 \text{ m./sec.}$$

Time taken by the train to cross the pole

$$= \frac{\text{Length of train}}{\text{Speed of train}} = \frac{150}{15} = 10 \text{ sec.}$$

18. A train is running with a speed of 80 km/hr. If the length of the train is 400 metre, then what time will it take to cross an electric pole?

- (a) 10 second (b) 6 second
(c) 18 second (d) 15 second

RRB NTPC 28.03.2016 Shift : 2

Ans : (c) Given, Speed of train = 80 km/hr.

$$= 80 \times \frac{5}{18} = \frac{400}{18} \text{ m./sec}$$

Length of train = 400 metre

$$\text{Time taken to cross the pole} = \frac{400}{\frac{400}{18}} = \frac{400}{400} \times \frac{18}{1} = 18 \text{ sec.}$$

19. A train moving with a speed of 120 km/hr crosses a pole in 9 seconds. What is the length of the train?

- (a) 240 metre (b) 300 metre
(c) 360 metre (d) 600 metre

RRB NTPC 18.01.2017 Shift : 3

Ans : (b) Given, 120 km/h = $120 \times \frac{5}{18}$ m/s

$$\text{Length of train} = 120 \times \frac{5}{18} \times 9$$

(Distance = speed \times time)

$$\Rightarrow 60 \times 5 = 300 \text{ m.}$$

Hence, Length of Train = 300 m.

Type - 3

When The Train Crosses Another Moving Person

20. A train passes two persons who are walking in the opposite direction of the train at the rate of 4 m/s and 10 m/s in 10 seconds and 8 seconds respectively. What is the speed of the train?

- (a) 10 m/s (b) 20 m/s
(c) 15 m/s (d) 40 m/s

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (b) : If a train crosses a person either in same or in opposite direction the train covers the same distance which is equal to the length of the train.

According to the question,

Let the speed of the train = x m/sec

$$\text{then, } (x + 4) \times 10 = (x + 10) \times 8$$

$$5x + 20 = 4x + 40$$

$$x = 20 \text{ m/sec}$$

So, the speed of the train is 20 m/sec.

21. A train overtakes two boys who are walking in the same direction as the train, at the rate of 5km/hr and 7 km/hr and passes them completely in 6 seconds and 9 seconds respectively. Find the length of the train.

- (a) 10 m (b) 5 m
(c) 30 m (d) 20 m

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Let the speed of train = x m/s

Then speed of train relatively both boys.

$$\text{then } \left(x - 5 \times \frac{5}{18}\right) \text{ and } \left(x - 7 \times \frac{5}{18}\right) \text{ m/s}$$

$$\therefore \text{Distance travel by train to cross the boys.} \\ = \text{length of train}$$

$$\therefore \left(x - 5 \times \frac{5}{18}\right) \times 6 = \left(x - 7 \times \frac{5}{18}\right) \times 9$$

$$\left(x - \frac{25}{18}\right) \times 2 = \left(x - \frac{35}{18}\right) \times 3$$

$$\left(2x - \frac{25}{9}\right) = \left(3x - \frac{35}{6}\right)$$

$$3x - 2x = \frac{35}{6} - \frac{25}{9}$$

$$\frac{315 - 150}{54} = \frac{165}{54}$$

$$x = \frac{55}{18} \text{ m/s}$$

Now, length of train

$$= \left(\frac{55}{18} - \frac{25}{18}\right) \times 6$$

$$= \frac{30}{18} \times 6 = 10 \text{ meter}$$

22. A carriage driving in a fog passed a man who was walking at the speed of 3 km/h in the same direction. He could see the carriage for 4 min and it was visible to him up to a distance of 100 m. What was the speed of the carriage?

- (a) 5 km/h (b) 4.5 km/h
(c) 6 km/h (d) 5.5 km/h

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the speed of carriage driving = x km/h

Distance covered by carriage driving = speed \times time

$$(x - 3) \times \frac{4}{60} = \frac{100}{1000}$$

$$\frac{(x - 3)}{15} = \frac{100}{1000}$$

$$x - 3 = 1.5$$

$$x = 4.5 \text{ km/h}$$

Type - 4

When The Train Crosses a Platform or Bridge

23. A 150m long train passes a canal of 102m in 7 seconds. The speed of the train is

- (a) 42 m/s (b) 72 m/s
(c) 36 m/s (d) 21 m/s

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

$$\text{Ans. (c) : Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed of train} = \frac{150 + 102}{7} \\ = \frac{252}{7} \\ = 36 \text{ m/s}$$

24. A train takes 15 s to pass completely through a station platform 50 m long and 10 s through another station platform 20 m long. Find the length of the train.

- (a) 40 m (b) 50 m
(c) 60 m (d) 35 m

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (a) : Let, the length of train = x m.

Distance	Time
$50 + x$ m	15 sec
$20 + x$ m	10 sec

With the same speed, the ratio of distances is directly proportional to the ratio of times.

$$\frac{50 + x}{20 + x} = \frac{15}{10} \Rightarrow 2(50 + x) = 3(20 + x) \\ \Rightarrow 100 + 2x = 60 + 3x \\ \Rightarrow 100 - 60 = 3x - 2x \\ \Rightarrow x = 40 \text{ m}$$

25. A train that is 110 m in length is running at a speed of 90 km/h. How much time will the train take to cross a bridge that is 180 m in length?

- (a) 10.6 s (b) 11.6 s
(c) 7.6 s (d) 9.6 s

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

$$\text{Ans. (b) : Speed of the train} = 90 \text{ km/h} = 90 \times \frac{5}{18} \\ = 25 \text{ m/sec}$$

Total distance = Length of the train + Length of the bridge

$$= 110 + 180 \\ = 290 \text{ m}$$

$$\text{Required Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{290}{25} = 11.6 \text{ seconds}$$

26. A train 800 m long is travelling at a speed of 120 km/h. How much time will it take to cross a bridge 1200 m long ?

- (a) 3 min (b) 1 min
(c) 2 min (d) 4 min

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (b) : Time = Distance / Speed

Distance = (800 + 1200) meter = 2 km.

$$\text{Required time} = \frac{2}{120} \text{ h} = \frac{2}{120} \times 60 \text{ min} \\ = 1 \text{ min}$$

27. The railway platform at Delhi station is 238 meters long. In how many seconds is it cleared by an express train which is 162 m long and travels at a speed of 120 km/h?

- (a) 10 Seconds (b) 14 Seconds
(c) 16 Seconds (d) 12 Seconds

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (d) : Given-

Length of train = 162 m

Length of platform = 238 m

Speed = 120 km/h

$$= 120 \times \frac{5}{18} = \frac{100}{3} \text{ m/s.}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{\text{Length of train} + \text{Length of platform}}{\text{Time}} \\ \frac{100}{3} = \frac{162 + 238}{\text{time}}$$

$$\text{Time} = \frac{400}{\frac{100}{3}} = \frac{1200}{100} = 12 \text{ Seconds}$$

28. Find the time taken by a 450 m long train travelling at the speed of 80 km/h to cross a platform of length 150 m.

- (a) 27 s (b) 28 s
(c) 25 s (d) 24 s

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (a) : \therefore Speed of train

$$= \frac{\text{Length of train} + \text{Length of platform}}{\text{Time taken to cross the platform}}$$

$$80 \text{ km/h} = \frac{450 \text{ m} + 150 \text{ m}}{t}$$

$$80 \times \frac{5}{18} = \frac{600}{t}$$

$$t = \frac{600 \times 18}{400} = 27 \text{ Seconds}$$

29. A train passes two bridges of lengths 600 m and 200 m in 80 s and 40 s respectively. The length of the train is:

- (a) 200 m (b) 250 m
(c) 220 m (d) 180 m

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : Suppose the length of the train = x m

According to the question,

$$\frac{x + 600}{80} = \frac{x + 200}{40}$$

$$x + 600 = 2x + 400$$

$$x = 200 \text{ m}$$

30. A train travelling at a speed of 69 km/h passes and electric pole in 8 seconds and a platform in 32 seconds. What is the length of the platform?

- (a) 460 m (b) 540 m
(c) 500 m (d) 480 m

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (a) Given,

$$\text{Speed of train} = 69 \text{ km/h} = \frac{69 \times 5}{18} \text{ m/s}$$

$$= \frac{115}{6} \text{ m/s}$$

$$\text{Distance travelled by train to pass electric pole (length of train)} = \frac{115 \times 8}{6} = \frac{460}{3} \text{ meter}$$

Let the length of platform is L (meter)

According to the question,

$$\frac{460}{3} + L = \frac{115}{6} \times 32$$

$$L = \frac{115}{6} \times 32 - \frac{460}{3}$$

$$L = \frac{1840 - 460}{3}$$

$$L = 460 \text{ m}$$

31. A train running with a speed of 84 km/h crosses a pole in 9 seconds and a platform in 30 seconds. Find the length of the platform.

- (a) 480 m (b) 500 m
(c) 540 m (d) 490 m

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : Given, Speed of trains = $84 \text{ km/h} = 84 \times \frac{5}{18} \text{ m/s}$

$$= 14 \times \frac{5}{3} \text{ m/s}$$

$$\therefore \text{Length of train} = 14 \times \frac{5}{3} \times 9 = 210 \text{ m}$$

Let the length of platform = x m

According to the question,

$$(210 + x) = \frac{70}{3} \times 30$$

$$(210 + x) = 700$$

$$x = 490 \text{ m}$$

32. A train having a length of 500 m passes through a tunnel of 1000 m in 1 minute. What is the speed of the train in km./hr
- (a) 75 km/hr. (b) 90 km/hr.
(c) 87 km/hr. (d) 96 km/hr.

RRB NTPC 03.04.2016 Shift : 2

Ans : (b) Let the speed of train = x km./hr.

According to the question,

$$\text{Distance} = (500+1000)\text{m} = 1.5 \text{ km}$$

$$\text{Time} = 1 \text{ minute} = 1/60 \text{ hour}$$

$$\frac{1.5 \text{ km}}{x} = \frac{1}{60} \text{ h}$$

$$x = 90 \text{ km./hr.}$$

Type - 5

When The Train Crosses a Platform and a Person or a Pole, etc

33. A train crosses a man on a platform in 10s and crosses the platform of 260 m in length in 20s. What is the length of the train?
- (a) 280 m (b) 260 m
(c) 220 m (d) 240 m

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let the length of the train is = x meters

According to the question –

$$\frac{260 + x}{20} = \frac{x}{10}$$

$$2x = x + 260$$

$$x = 260 \text{ meters}$$

34. A 250 metre long train crosses an electric pole in 8 second. If it takes 20 second to cross a platform then what is the length of platform?
- (a) 375 metre (b) 625 metre
(c) 500 metre (d) 675 metre

RRB NTPC 29.03.2016 Shift : 2

Ans : (a) Let the length of platform = x m.

and speed of train = y m/s.

According to the question,

$$\frac{250}{8} = y \dots\dots\dots (i)$$

Again from question-

$$\frac{250 + x}{20} = y \dots\dots\dots (ii)$$

From equation (i) and (ii)-

$$\frac{250}{8} = \frac{250 + x}{20}$$

$$5000 = 2000 + 8x$$

$$8x = 3000 \Rightarrow x = 375 \text{ m.}$$

Hence length of platform = 375 m.

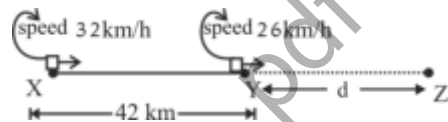
Type - 6

Problems Based on Two Trains Having Same Direction

35. Two trains are running in the same direction with the speeds of 32 km/h and 26 km/h respectively from X and Y. If X is 42 km away from Y and if they meet at a point Z beyond Y, then the distance from Y to Z will be:
- (a) 148 km (b) 165 km
(c) 182 km (d) 236 km

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (c)



Let the distance from Y to Z is d km then both the trains will take the same time to reach point Z.

$$\frac{42 + d}{32} = \frac{d}{26}$$

$$1092 + 26d = 32d$$

$$1092 = 6d$$

$$d = \frac{1092}{6} = 182 \text{ km}$$

So the distance from Y to Z = 182 km

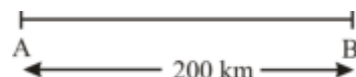
Type - 7

When Two Trains Start in Opposite Directions From Two Places

36. Two trains starting at the same time in opposite directions from two stations 200 km apart meet each other at a distance of 110 km from one of the stations. What is the ratio of their speed?
- (a) 11 : 9 (b) 10 : 9
(c) 12 : 8 (d) 13 : 7

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) : Total distance = 200 km



Trains running towards each other from different stations at the same time meet each other at a distance of 110 km from one of them.

So, remaining distance = 200 – 110 = 90 km

When the time is equal, the ratio of the speeds to the distance is equal.

$$\frac{S_1}{S_2} = \frac{D_1}{D_2} = \frac{110}{90} = 11:9$$

37. Two trains going in opposite directions, start at the same time from two stations that are 250 km apart. The trains meet each other at a distance of 130 km from one of the stations. Find the ratio of their speeds.

- (a) 15 : 14 (b) 9 : 8
(c) 13 : 12 (d) 12 : 11

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) :

If train A will run 130 km. then train B will run 120 km.

$$\text{So, } \frac{S_1}{S_2} = \frac{d_1}{d_2} = \frac{130}{120}$$

(Ratio of both the trains run at the same time)

$$S_1 : S_2 = 13 : 12$$

38. Two trains 131 m and 89 m long are moving in opposite direction one at the speed of 42 km/h, the other at a speed of 30 km/h. In what time will they be completely clear of each other from the moment they meet?

- (a) 10 s (b) 11 s
(c) 20 s (d) 18 s

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (b) Given,

Speed of the first train = 42 km/h = $42 \times \frac{5}{18} = \frac{35}{3}$ m/s

Speed of the second train = 30 km/h = $30 \times \frac{5}{18} = \frac{25}{3}$ m/s

\therefore Relative speed = $\frac{35}{3} + \frac{25}{3} = \frac{60}{3} = 20$ m/s

Distance = 131 + 89 = 220 m

Required time = $\frac{220}{20} = 11$ s

39. Two trains 136 m and 185 m in length respectively are running in opposite directions, one at a speed of 70 km/h and the other at a speed of 65 km/h. In what time will they be completely passed of each other from the moment they meet?

- (a) 8.56 s (b) 4.78 s
(c) 9.67 s (d) 7.43 s

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (a) : Total relative speed of the train = (70+65) km/h = 135 km/h

$$= 135 \times \frac{5}{18} \text{ m/s}$$

Sum of length of the trains = 136+185 = 321 m.

Let the time taken by both the trains to cross each other = t

$$135 \times \frac{5}{18} = \frac{321}{t}$$

Hence, t = 8.56 seconds

40. Train A, running at the speed of 80 km/hr crosses train B, running at the speed of 70 km/hr in the opposite direction. Both trains cross each other in 30 seconds. If the length of train A is 300 m. then the length of train B is:

- (a) 950 m (b) 750 m
(c) 850 m (d) 855 m

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (a) : Relative speed of trains when they running in opposite direction = (80 + 70) km/h = 150 km/h.

$$150 \times \frac{5}{18} = \frac{125}{3} \text{ m/sec}$$

Let the length of train B = x m.

And length of train A = 300 m (given)

\therefore Time = $\frac{\text{Distance}}{\text{Speed}}$

$$30 = \frac{x + 300}{125/3}$$

$$10 \times 125 = x + 300$$

$$1250 = x + 300$$

$$x = 1250 - 300$$

$$x = 950 \text{ m.}$$

Hence, the length of train B = x m = 950 m.

41. Two trains start at the same time from two stations and proceed towards each other at the speeds of 20 km/h and 25 km/h respectively. When they meet, it is found that one train has travelled 80 km more than the other. Find the distance between the two stations.

- (a) 700 km (b) 710 km
(c) 730 km (d) 720 km

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let the time taken by train is 't'

According to the question,

$$25t - 20t = 80$$

$$5t = 80$$

$$t = 16$$

Total distance = 25t + 20t = 45 t

Total distance = 45 × 16 = 720 km

Type - 8

Problems Based on Average Speed of Trains

42. An express train travelled at an average speed of 100 km/h stopping for 3 min after every 75 km. How much time it took the express train to travel 600 km?

- (a) 370 min (b) 381 min
(c) 384 min (d) 308 min

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,

$$\frac{600}{75} = 8 \text{ times}$$

Then train will stop = $(8-1) = 7$ times

Total time = Distance/speed

$$= 600/100 = 6 \text{ hours}$$

$$= (6 \times 60 + 7 \times 3) \text{ min}$$

$$= 360 + 21 = 381 \text{ minutes}$$

- 43. If a train runs at an average speed of 42 km/h, then it covers a certain distance in 45 min. What is the speed at which the train must run to reduce the time of the same journey to 35 min?**

- (a) 52.5 km/h (b) 49 km/h
(c) 52 km/h (d) 54 km/h

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (d) : The average speed of train = 42 km/h

$$\text{Time} = \frac{45}{60} = \frac{3}{4} \text{ h}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$= 42 \times \frac{3}{4} = \frac{21 \times 3}{2}$$

To cover the same distance in 35 minutes,

$$\begin{aligned} \text{Speed of Train} &= \frac{63 \times 60}{2 \times 35} \\ &= 9 \times 6 \\ &= 54 \text{ km/h} \end{aligned}$$

- 44. A train moves 1 km at a uniform speed of 240 km/hr and next 1 km at 80 km/hr. What is the average speed of train?**

- (a) 160 km/hr (b) 180 km/hr
(c) 120 km/hr (d) 200 km/hr

RRB NTPC 03.04.2016 Shift : 3

Ans : (c) According to the question,

$$\begin{aligned} \text{Average speed of train} &= \frac{2ab}{a+b} \\ &= \frac{2 \times 240 \times 80}{240 + 80} = \frac{2 \times 240 \times 80}{320} \\ &= 120 \text{ km./hr.} \end{aligned}$$

- 45. A train covers first 40 km of distance at 80 km/hr and second 30 km of distance in 60 km/hr. Then find its average speed?**

- (a) 62 km/hr (b) 64 km/hr
(c) 65 km/hr (d) 70 km/hr

RRB NTPC 27.04.2016 Shift : 2

Ans : (d) According to the question,

$$\begin{aligned} \left[\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}} \right] \\ \text{Average speed} &= \frac{40 + 30}{\frac{40}{80} + \frac{30}{60}} = \frac{70}{\frac{1}{2} + \frac{1}{2}} = \frac{70}{1} \\ \text{Average Speed} &= 70 \text{ km/hr.} \end{aligned}$$

Type - 9 Miscellaneous

- 46. A train covered a certain distance at a uniform speed. If the train had been 12 km/h faster, it would have taken 8 hours less than the scheduled time. If the train were slower by 12 km/h, the train would have taken 12 hours more than the scheduled time. Find the length of the journey (in km).**

- (a) 1480 (b) 2860
(c) 2880 (d) 1440

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : Let the speed of the train be x km/h and the time has taken by t hour.

Since, Total distance = xt km

Case- I

Speed increases by 12 km/h and the time taken reduces by 8 hours.

$$\text{Then distance} = (x + 12)(t - 8)$$

$$\Rightarrow xt = (x + 12)(t - 8)$$

$$\Rightarrow xt = xt - 8x + 12t - 96$$

$$\Rightarrow -8x + 12t = 96 \dots\dots\dots (i)$$

Case- II

Speed decreases by 12 km/h and the time taken increases by 12 hours

$$\text{Then distance} = (x - 12)(t + 12)$$

$$\Rightarrow xt = (x - 12)(t + 12)$$

$$\Rightarrow xt = xt + 12x - 12t - 144$$

$$\Rightarrow 12x - 12t = 144 \dots\dots\dots (ii)$$

From eq (i) and (ii) -

$$x = 60$$

On putting the value of x in equation (i)

$$\text{Then } t = 48$$

Hence, the length of the journey = xt

$$= 60 \times 48$$

$$= 2880 \text{ km}$$

- 47. A man travelling in a train notices that he can count 21 telephone posts in 1 min. If the poles are 50 m apart, then at what speed is the train travelling?**

- (a) 60 km/h (b) 21 km/h
(c) 50 km/h (d) 65 km/h

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (a) : The distance between 21 telephones poles = $20 \times 50 = 1000 \text{ m}$

Time taken to cross the poles = 1 min
= 60 sec

$$\begin{aligned} \therefore \text{Speed of train} &= \frac{1000 \text{ m}}{60 \text{ s}} \\ &= \frac{1000}{60} \times \frac{18}{5} \text{ km/h} \\ &= 60 \text{ km/h} \end{aligned}$$

48. Excluding stoppage station, the speed of a train is 60 km/h and including stoppage station it travels at a speed of 45 km/h. For how many minutes does the train stop per hour?

- (a) 15 mins (b) 30 mins
(c) 10 mins (d) 20 mins

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (a) : Excluding stoppage station, speed of train = 60 km/h

Including stoppage speed of train = 45 km/h

According to the question,

$$\begin{aligned}\text{Train stop per hour} &= \frac{60-45}{60} \times 60 \\ &= \frac{15}{60} \times 60 = 15 \text{ minutes}\end{aligned}$$

49. A train covers a certain distance at a speed of 240 km/h in 5 hours. If a flight has to cover the same distance in 45 mins, it must travel at a speed of:

- (a) 1250 km/h (b) 1600 km/h
(c) 1440 km/h (d) 1200 km/h

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let the speed of flight is x km/h.

According to the question,

$$\begin{aligned}5 \times 240 &= x \times 45 \times \frac{1}{60} \\ x &= \frac{5 \times 240 \times 60}{45} \\ x &= 1600 \text{ km/h}\end{aligned}$$

50. A train running at 70 km/h passes a person riding parallel to the railway line moving in the opposite direction in 2 seconds. If the rider goes in the same direction, the train takes 5 seconds to pass him. What is the speed of the rider?

- (a) 30 km/h (b) 20 km/h
(c) 40 km/h (d) 60 km/h

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let the speed of rider be x km/h

According to the question,

$$2 \text{ sec} = \frac{\ell}{(70+x)} \text{ ————— (i)}$$

$$\text{and, } 5 \text{ sec} = \frac{\ell}{(70-x)} \text{ ————— (ii)}$$

From eq (i) and eq (ii)–

$$2(70+x) = 5(70-x)$$

$$140 + 2x = 350 - 5x$$

$$7x = 350 - 140$$

$$7x = 210 \Rightarrow x = 30 \text{ km/h}$$

51. The speeds of three trains are in the ratio of 2 : 3 : 5. The amount of time taken by these trains to travel the same distance is in the ratio of :

- (a) $\frac{1}{2} : \frac{1}{3} : \frac{1}{5}$ (b) 6:12:18
(c) 2:3:4 (d) 2:3:5

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (a) : We know that,

When the distance is equal, ratio of times is inversely proportional to ratio of speeds.

Ratio of speeds = 2:3:5

$$\text{So, Ratio of times} = \frac{1}{2} : \frac{1}{3} : \frac{1}{5}$$

52. A train starts at a speed of 40 km/h. Its speed increases every 1 h by 20 km/h. How much time does it take to cover a distance of 470 km?

- (a) 4 h 30 min (b) 5 h 30 min
(c) 6 h (d) 6 h 30 min

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (b) : Given,

Speed of train = 40 km/h

According to the question,

Speed of train in second hour = 60 km/h

Speed of train in third hour = 80 km/h

Speed of train in fourth hour = 100 km/h

Speed of train in fifth hour = 120 km/h

Speed of train in sixth hour = 140 km/h

Distance travelled in 5 hours = 40+60+80+100+120 = 400km

Remaining Distance = 470 – 400 = 70 km

Hence, Time taken to cover a distance of 70 km at a speed of 140 km/h

$$70 \times \frac{60}{140} = 30 \text{ min}$$

Hence total time taken to cover a distance of 470 km = 5 hours 30 minutes.

53. If the speeds of a train in 10 successive hours are $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9$ and a_{10} then the average speed of the train is:

- (a) Geometric mean of $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9$ and a_{10} .
(b) Harmonic mean of $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9$ and a_{10} .
(c) Arithmetic mean of $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9$ and a_{10} .
(d) Median of $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9$ and a_{10} .

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (c) : Average speed of train = $\frac{\text{Total distance}}{\text{Total time}}$

$$= \frac{a_1 + a_2 + a_3 + a_4 + a_5 + a_6 + a_7 + a_8 + a_9 + a_{10}}{10}$$

So, it is clear that the average speed of the train is equal to the arithmetic mean of $a_1, a_2, a_3, a_4, \dots, a_{10}$.

Boat & Stream

Type - 1 Problems Based on Finding The Speed of Stream/Boat/Person etc

1. The speed of a boat in still water is 14 km/h. It goes 28 km downstream in 1 h 45 min. Find the speed of the stream.

- (a) 2 km/h (b) 7 km/h
(c) 12 km/h (d) 16 km/h

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let the speed of the stream be x km/h.

$$1\text{h } 45\text{ min} = 1 + \frac{45}{60} = 1 + \frac{3}{4} = \frac{7}{4}\text{ h}$$

According to the question –

$$14 + x = \frac{28}{7/4}$$

$$14 + x = 16$$

$$x = 2\text{ km/h}$$

Hence, Speed of the stream is 2 km/h.

2. A motor boat, whose speed is 11 km/h in still water, goes 28 km downstream in 2 h 20 min. Find the speed of the stream.

- (a) 12 km/h (b) 10 km/h
(c) 1 km/h (d) 11 km/h

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given–

Speed of boat = 11 km/h in still water

Distance = 28 km

$$\text{Time} = 2\text{ h } 20\text{ min} = \frac{7}{3}\text{ h}$$

Let the speed of the stream = x km/h

According to the question –

$$\frac{28}{11+x} = \frac{7}{3}$$

$$11+x = 12$$

$$x = 1\text{ km/h}$$

Hence, the speed of the stream is 1 km/h.

3. In still water the speed of a boat is 11 km/hr. If the boat covers 19 km in 2 hours in upstream. Find the speed of the stream.

- (a) 20.5 km/hr. (b) 11.5 km/hr.
(c) 1.5 km/hr. (d) 3 km/hr.

RRB NTPC 29.04.2016 Shift : 1

Ans : (c) Speed of boat in still water = 11 km/hr.

Distance travelled by boat in the 2 hours in upstream = 19 km.

$$\text{Speed of boat in the upstream} = \frac{19}{2}\text{ km/hr.}$$

$$\begin{aligned}\text{Speed of stream} &= 11 - \frac{19}{2} = \frac{22-19}{2} \\ &= \frac{3}{2} = 1.5\text{ km/hr.}\end{aligned}$$

4. Ramu can ride a boat at 9 km/hr, speed in still water. It takes twice the time to go in the opposite direction of the stream than going in the direction of the stream. Find the speed of the stream.

- (a) 16 km/hr. (b) 8 km/hr.
(c) 3 km/hr. (d) 9 km/hr.

RRB NTPC 16.04.2016 Shift : 1

Ans : (c) Speed of boat in still water = 9 km/hr.

Speed of stream = x km/hr.

And distance = d km.

Speed of boat in the downstream = $(9 + x)$ km/hr.

Speed of boat in the upstream = $(9 - x)$ km/hr.

$$\text{From } \text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\Rightarrow \frac{d}{9+x} \times 2 = \frac{d}{9-x}$$

$$\Rightarrow 18 - 2x = 9 + x$$

$$= 3x = 9$$

$$x = 3$$

Hence speed of stream = 3 km/hr.

5. A man can ride a boat at a speed of 4 km/hr. He finds that the time taken to travel in the opposite direction of the stream is double the time it takes to travel in the direction of the flow of the stream. Find the speed of the stream.

- (a) 1.5 (b) 1.3
(c) 2 (d) 1

RRB NTPC 27.04.2016 Shift : 1

Ans : (b) Let the speed of stream = x km/hr.
 Speed of boat in the downstream = $(4+x)$ km/hr.
 Speed of boat in the upstream = $(4-x)$ km/hr.

$$\therefore \text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\frac{d}{4-x} = \frac{2d}{4+x}$$

$$4+x = 8-2x$$

$$3x = 4$$

$$x = 1.3 \text{ km/hr.}$$

6. A person travels a distance of 16 km in two hours in the downstream. If he travels half the distance in the upstream in the same time, then find the speed of the stream.

- (a) 4 km/hr. (b) 2 km/hr.
 (c) 3 km/hr. (d) 1 km/hr.

RRB NTPC 27.04.2016 Shift : 3

Ans : (b) Let the speed of stream is x km/hr. and speed of man is y km/hr.

Speed of man in the downstream = $(x+y)$ km/h

Speed in the upstream = $(y-x)$ km/h

According to the question,

$$x + y = \frac{16}{2} \Rightarrow x + y = 8 \dots\dots(i)$$

$$y - x = \frac{8}{2} \Rightarrow y - x = 4 \dots\dots(ii)$$

On subtracting equation (ii) from equation (i)

$$2x = 4 \Rightarrow x = 2 \text{ km/h}$$

7. Raju travels 150 km in 7.5 hours moving downstream. The speed of the stream is 5 km/h. Find the speed with which Raju should row the boat to reach back in the same time.

- (a) 10 km/h (b) 18 km/h
 (c) 25 km/h (d) 7.5 km/h

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) :

Let Raju increases his upstream speed by x km/h to return in the same time

$$\text{Speed of Raju in downstream} = \frac{150}{7.5} = 20 \text{ km/h}$$

\therefore Speed of stream = 5 km/h.

\therefore Speed of Raju in still water = $20 - 5 = 15$ km/h

Speed of Raju in upstream = $15 - 5 = 10$ km/h

According to the question,

$$\therefore (10 + x) = \frac{150}{7.5}$$

$$x = 20 - 10$$

$$x = 10 \text{ km/h.}$$

$$\text{Hence speed of Raju} = (15 + 10) \text{ km/h} \\ = 25 \text{ km/h.}$$

8. The speed of a boat in the opposite direction of the flow is 40 km/hr, and in stagnant water 55 km/hr. What will be the speed of boat in the flow direction of the stream.

- (a) 75 km/hr. (b) 70 km/hr.
 (c) 60 km/hr. (d) 65 km/hr.

RRB NTPC 02.04.2016 Shift : 2

Ans : (b) Let the speed of boat in the downstream = x km/hr

Speed of boat in still water = $\frac{1}{2}$ (speed in the downstream + speed in the upstream)

$$55 = \frac{1}{2} (x + 40)$$

$$110 = x + 40$$

$$x = 110 - 40$$

$$x = 70$$

Hence speed of boat in the downstream = 70 km/hr.

9. A boat moves in the upstream from city P to city Q and then it returns in the downstream from city Q to city P. If the speed of the boat in the stagnant water is 35 km/hr and the stream speed is 5 km/hr. then in total journey what is the Average speed of boat?

- (a) 36.28 km/hr. (b) 34.28 km/hr.
 (c) 35 km/hr. (d) 33.33 km/hr.

RRB NTPC 03.04.2016 Shift : 3

Ans : (b) Speed in the upstream

$$= 35 - 5 = 30 \text{ km/hr.}$$

Speed in the downstream = $35 + 5 = 40$ km/hr.

$$\text{Average speed of boat} = \frac{2ab}{a+b}$$

$$= \frac{2 \times 40 \times 30}{40 + 30} = \frac{2 \times 40 \times 30}{70} = 34.28 \text{ km/hr.}$$

10. A boat moves from the city x to city 'y' in the upstream and then returns from city 'y' to city 'x' in the downstream. If in still water the speed is 40 km/hr. and the speed of stream is 10 km/hr. then what is the average speed of the total journey?

- (a) 36.5 km/hr. (b) 34.5 km/hr.
 (c) 37.5 km/hr. (d) 33.33 km/hr.

RRB NTPC 02.04.2016 Shift : 1

Ans : (c) Speed of boat in the downstream

$$= B + R = 40 + 10 = 50 \text{ km/hr.}$$

Speed of boat in the upstream

$$= B - R = 40 - 10 = 30 \text{ km/hr.}$$

\therefore Average speed of boat over the entire journey

$$= \frac{2ab}{a+b} = \frac{2 \times 50 \times 30}{50 + 30} = \frac{2 \times 1500}{80} = 37.5 \text{ km/hr.}$$

Type - 2

Problems Based on Finding The Distance and Time

15. A boat takes 7 hours to move 63 km downstream and 30 km upstream. The boat takes 6 hours to move 28 km downstream and 48 km upstream. How much time will it take to move 35 km downstream and 27 km upstream?

- (a) 5 hours 20 minutes (b) 5 hours
(c) 4 hours 50 minutes (d) 4 hours 45 minutes

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) : Let speed of boat in downstream = x km/h.
And, speed of boat in upstream = y km/h.

According to 1st condition, $\frac{63}{x} + \frac{30}{y} = 7$ ——— (i)

According to the 2nd condition, $\frac{28}{x} + \frac{48}{y} = 6$

On multiplying by $\frac{9}{4}$ in both sides,

$$\Rightarrow \frac{63}{x} + \frac{108}{y} = \frac{6 \times 9}{4}$$

$$\Rightarrow \frac{63}{x} + \frac{108}{y} = \frac{27}{2} \text{ ——— (ii)}$$

From equation (ii) and (i)–

$$\frac{78}{y} = \frac{13}{2} \Rightarrow y = 12 \text{ km/h.}$$

On putting y = 12 in equation (i),

$$\begin{aligned} \frac{63}{x} &= 7 - \frac{5}{2} \\ \Rightarrow x &= 14 \text{ km/h.} \end{aligned}$$

Hence, Time taken by boat to travel a distance of 35 km

in downstream and 27 km in upstream = $\frac{35}{x} + \frac{27}{y}$

$$= \frac{35}{14} + \frac{27}{12}$$

$$= \frac{5}{2} + \frac{9}{4}$$

$$= \frac{19}{4} \text{ hours}$$

$$= 4 \text{ hours 45 minute}$$

16. The speed of a stream is 3 km/h and the speed of a man in still water is 5 km/h. The time taken by the man to swim 26 km downstream is:

- (a) $3\frac{1}{4}$ hours (b) $4\frac{1}{3}$ hours
(c) $1\frac{3}{4}$ hours (d) $4\frac{3}{4}$ hours

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the time taken by man is T hours.

Speed of stream = 3 km/h

Speed of man = 5 km/h

According to the question,

$$\text{Speed of downstream} = \frac{\text{Distance}}{\text{Time}}$$

$$\Rightarrow 5 + 3 = \frac{26}{T}$$

$$T = \frac{26}{8} = 3\frac{1}{4} \text{ hours}$$

17. The speed of a stream is 3 km/h and the speed of a man in still water is 6 km/h. The time taken by the man to swim 37 km downstream is:

- (a) $4\frac{1}{3}$ h (b) $4\frac{1}{9}$ h
(c) $4\frac{3}{4}$ h (d) $1\frac{3}{4}$ h

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (b) : Speed of man in the downstream

= Speed of man + Speed of current

= 6 + 3 = 9 km/h

$$\therefore \text{Required time} = \frac{37}{9} = 4\frac{1}{9} \text{ hr.}$$

18. The speed of a boat in still water is 12 km/hr. and the speed of stream is 3 km/hr. A person goes 135 km in the upstream by boat and returns to the starting point by walking in the downstream. Find the time taken to cover the total journey in hours.

- (a) 24 (b) 48
(c) 36 (d) 30

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) Let the total time taken is t hour.

$$t = \frac{d}{B+R} + \frac{d}{B-R}$$

(B = Speed of boat

R = Speed of stream)

$$t = \frac{135}{12+3} + \frac{135}{12-3}$$

$$t = \frac{135}{15} + \frac{135}{9}$$

$$t = 9 + 15$$

$$t = 24 \text{ hours}$$

Mensuration

Type - 1 Problems Based on Triangles

1. The altitude of an equilateral triangle is 12 cm. What is the perimeter of the triangle?

- (a) $18\sqrt{3}$ cm (b) 42 cm
(c) $24\sqrt{3}$ cm (d) $30\sqrt{3}$ cm

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (c) : Given,

Length of altitude of an equilateral triangle = 12 cm

$$\frac{\sqrt{3}}{2} \times \text{Side} = 12$$

$$\text{Side} = 8\sqrt{3} \text{ cm}$$

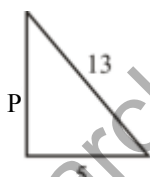
$$\therefore \text{Perimeter of the triangle} = 3 \times \text{side} \\ = 3 \times 8\sqrt{3} = 24\sqrt{3} \text{ cm}$$

2. The length of the hypotenuse of a right-angled triangle is 13 cm and the length of one of the other two sides is 5 cm. What is the area (in cm^2) of the triangle?

- (a) 28 (b) 29.5
(c) 30 (d) 32.5

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (c) :



From Pythagoras Theorem-

$$\begin{aligned} \text{Perpendicular (P)} &= \sqrt{(\text{Hypotenuse})^2 - (\text{Base})^2} \\ &= \sqrt{(13)^2 - (5)^2} \\ &= \sqrt{169 - 25} \\ &= \sqrt{144} \\ &= 12 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Area of right - angled triangle} &= \frac{1}{2} \times \text{Perpendicular} \times \text{Base} \\ &= \frac{1}{2} \times 12 \times 5 \\ &= 30 \text{ cm}^2 \end{aligned}$$

3. The length of the three sides of a triangle are 12 cm, 15 cm and 21 cm, respectively, Find the area (in cm^2) of the triangle.

- (a) $36\sqrt{6}$ (b) $30\sqrt{6}$
(c) $72\sqrt{6}$ (d) $48\sqrt{6}$

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (a) : Given,

Length of the three sides of a triangle

$$a = 12 \text{ cm}, b = 15 \text{ cm}, c = 21 \text{ cm}$$

$$\text{Semi-perimeter(s)} = \frac{a+b+c}{2}$$

$$= \frac{12+15+21}{2}$$

$$= 24 \text{ cm}$$

$$\text{Area of triangle } (\Delta) = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{24(24-12)(24-15)(24-21)}$$

$$= \sqrt{24 \times 12 \times 9 \times 3}$$

$$= 36\sqrt{6} \text{ cm}^2$$

4. The base of a right-angled triangle is 12 cm and the difference between the other two sides is 6 cm. What will be the perimeter of the triangle?

- (a) 30 cm (b) 54 cm
(c) 36 cm (d) 18 cm

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$b = 12 \text{ cm}$$

$$c - a = 6 \text{ cm}$$

$$c = a + 6$$

$$\therefore a^2 + b^2 = c^2$$

$$b^2 = c^2 - a^2 = (c + a)(c - a)$$

$$144 = (c + a) \times 6$$

$$144 = 6c + 6a$$

$$144 = 6(6 + a) + 6a$$

$$144 = 36 + 12a$$

$$a = 9 \text{ cm}$$

$$c - a = 6$$

$$c - 9 = 6$$

$$c = 15 \text{ cm}$$

$$\begin{aligned} \text{Hence the perimeter of the triangle} &= a + b + c \\ &= 9 + 12 + 15 \\ &= 36 \text{ cm} \end{aligned}$$

5. If the hypotenuse of a right angled isosceles is 8 cm, then the area of the triangle is:

- (a) 16 cm^2 (b) $2\sqrt{32} \text{ cm}^2$
(c) $\sqrt{32} \text{ cm}^2$ (d) 8 cm^2

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (a) :

∴ Area of right angled isosceles triangle

$$= \frac{(\text{Hypotenuse})^2}{4} = \frac{8 \times 8}{4}$$

$$= 16 \text{ cm}^2$$

6. Area of an equilateral triangle is $49\sqrt{3} \text{ cm}^2$. Find the side of the triangle.

- (a) 18 cm (b) 14 cm
(c) 12 cm (d) 16 cm

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (b) : ∴ Area of equilateral triangle $= \frac{\sqrt{3}}{4}(a)^2$
(Where a = side of triangle)

$$\therefore \frac{\sqrt{3}}{4}(a)^2 = 49\sqrt{3}$$

$$a^2 = 49 \times 4 = 7^2 \times 2^2$$

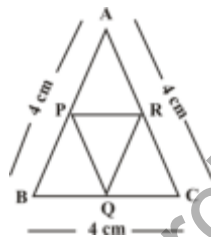
$$\therefore a = 14 \text{ cm}$$

7. ABC is an equilateral triangle. P, Q and R are the midpoints of sides AB, BC and AC respectively. The length of the side of the triangle is 4 cm. The area of triangle PQR is:

- (a) $\frac{1}{4}\sqrt{3} \text{ cm}^2$ (b) $\frac{\sqrt{3}}{2} \text{ cm}^2$
(c) $\sqrt{3} \text{ cm}^2$ (d) $\frac{\sqrt{3}}{9} \text{ cm}^2$

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (c)



Area of $\Delta PQR = \frac{1}{4} \times \text{Area of equilateral triangle ABC}$

$$= \frac{1}{4} \times \frac{\sqrt{3}}{4} \times 4^2 = \sqrt{3} \text{ cm}^2$$

8. Find the area of a triangle whose sides are 5 cm, 7 cm and 11 cm.

- (a) 12.97 cm^2 (b) 12.27 cm^2
(c) 12.30 cm^2 (d) 12.50 cm^2

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (a) : $s = \frac{a+b+c}{2} = \frac{5+7+11}{2} = 11.5$

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$$= \sqrt{11.5(11.5-5)(11.5-7)(11.5-11)}$$

$$= \sqrt{11.5 \times 6.5 \times 4.5 \times 0.5}$$

$$= \sqrt{168.18}$$

$$= 12.97 \text{ cm}^2$$

9. If the area of a triangle with base 12 cm is equal to the area of a square with side 12 cm, then the altitude of the triangle will be:

- (a) 12 cm (b) 18 cm
(c) 36 cm (d) 24 cm

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : Area of triangle = Area of square

$$\frac{1}{2} \times \text{Base} \times \text{Height} = (12)^2$$

$$\frac{1}{2} \times 12 \times \text{Height} = 144$$

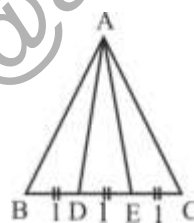
$$\text{Height} = 24 \text{ cm}$$

10. The area of triangle ABC is 39 cm^2 . D and E are two points on BC such that $BD = DE = EC$, then what is the area of triangle ADC?

- (a) 26 cm^2 (b) $\frac{9}{4} \text{ cm}^2$
(c) 13 cm^2 (d) 52 cm^2

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (a) :



∴ Area of $\Delta ABC = 3 \text{ unit}$

$$\therefore 3 \text{ unit} \rightarrow 39 \text{ cm}^2$$

$$1 \text{ unit} \rightarrow 13 \text{ cm}^2$$

∴ Area of $\Delta ADC = 2 \text{ unit}$

$$\therefore 2 \text{ unit} \rightarrow 13 \times 2 = 26 \text{ cm}^2$$

11. If the inradius of a triangle with perimeter 64 cm is 8 cm, then find the area of the triangle.

- (a) 265 cm^2 (b) 120 cm^2
(c) 256 cm^2 (d) 146 cm^2

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (c) : Inradius (r) $= \frac{\text{Area}(\Delta)}{\text{Semi perimeter}(s)}$

$$\Delta = r \times s = 8 \times 32 = 256 \text{ cm}^2$$

12. The ratio of bases of two triangles is 4 : 5 and that of their areas is 8 : 15. What is the ratio of their corresponding altitudes?

- (a) 2 : 3 (b) 1 : 2
(c) 3 : 2 (d) 1 : 3

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Suppose base of triangle is $4x$ and $5x$ and height is h_1 and h_2 then–

According to the question,

Ratio of area of triangles = $8 : 15$

$$\frac{4x \times h_1}{5x \times h_2} = \frac{8}{15}$$

$$\frac{h_1}{h_2} = \frac{8}{15} \times \frac{5}{4}$$

$$\frac{h_1}{h_2} = \frac{40}{60}$$

$$\frac{h_1}{h_2} = \frac{2}{3}$$

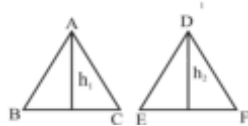
$$h_1 : h_2 = 2 : 3$$

- 13. The corresponding altitudes of two similar triangles are 8 cm and 11 cm. Find the ratio of their areas:**

- (a) $64 : 121$ (b) $11 : 8$
(c) $8 : 11$ (d) $121 : 64$

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question



$h_1 = 8$ cm, $h_2 = 11$ cm

$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \left(\frac{h_1}{h_2}\right)^2$$

$$\frac{(8)^2}{(11)^2} = \frac{64}{121}$$

- 14. Given that $\triangle ABC \sim \triangle DEF$, if $BC = 12.5$ cm and $EF = 10$ cm, then the areas of $\triangle ABC$ and $\triangle DEF$ are in the ratio of:**

- (a) $3 : 4$ (b) $1 : 2$
(c) $16 : 25$ (d) $25 : 16$

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (d) : $\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \left(\frac{BC}{EF}\right)^2$ (By theorem)

$$= \frac{(12.5)^2}{(10)^2}$$

$$= \frac{12.5 \times 12.5}{10 \times 10}$$

$$= \frac{25}{16}$$

Required ratio = $25 : 16$

- 15. When the side of an equilateral triangle is made three times the original side, the area of the new equilateral triangle will become:**

- (a) 12 times of the original area
(b) 6 times of the original area
(c) 3 times of the original area
(d) 9 times of the original area

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (d) : Suppose, the side of original triangle is ' a ' and area is A_1 and the new area of triangle is A_2

$$\therefore \text{Area of equilateral triangle } (A_1) = \frac{\sqrt{3}}{4} \times a^2$$

According to the question,

On increasing side by 3 times –

$$\text{New area of equilateral triangle } (A_2) = \frac{\sqrt{3}}{4} (3a)^2$$

$$= \frac{\sqrt{3}}{4} \times 9a^2$$

$$= 9 \times \frac{\sqrt{3}}{4} a^2$$

$$A_2 = 9A_1$$

Hence, area of new equilateral triangle will become 9 times of the original area.

- 16. The perimeter of a triangle is 100 cm. If its two sides are equal and the third side is 10 cm more than the equal sides. What is the length of the third side?**

- (a) 30 (b) 25
(c) 40 (d) 36

RRB NTPC 03.04.2016 Shift : 3

Ans : (c) : \therefore Two sides of a triangle are equal

\therefore Triangle will be isosceles



Perimeter of Triangle = 100 cm

$$x + x + x + 10 = 100$$

$$3x + 10 = 100$$

$$3x = 90$$

$$\boxed{x = 30}$$

So length of the third side = $x + 10 = 30 + 10 = 40$ cm.

- 17. If side of an equilateral triangle is 4 unit, then area of that triangle is :**

- (a) $\frac{16}{\sqrt{3}}$ square unit (b) $4\sqrt{3}$ square unit
(c) $\frac{2}{\sqrt{3}}$ square unit (d) $\sqrt{3}$ square unit

RRB NTPC 30.03.2016 Shift : 2

Ans : (b)

$$\begin{aligned}\text{Area of equilateral triangle} &= \frac{\sqrt{3}}{4} \times (\text{side})^2 \\ &= \frac{\sqrt{3}}{4} \times 16 = 4\sqrt{3} \text{ square unit}\end{aligned}$$

18. The area of a triangle is 456 cm^2 and its height is 24 cm. Then the length of its base is:

- (a) 32 (b) 36
(c) 34 (d) 38

RRB NTPC 06.04.2016 Shift : 2

Ans : (d) Area of triangle = 456 cm^2

Height = 24 cm

Base = ?

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$456 = \frac{1}{2} \times 24 \times \text{base}$$

$$\text{Base} = \frac{456}{12}, \text{ base} = 38 \text{ cm.}$$

19. Find the area of the triangle whose sides are 11 cm, 7 cm and 14 cm.

- (a) $7\sqrt{22}$ (b) $11\sqrt{8}$
(c) $12\sqrt{10}$ (d) $13\sqrt{3}$

RRB NTPC 29.04.2016 Shift : 1

Ans : (c) $a = 11 \text{ cm.}, b = 7 \text{ cm.}, c = 14 \text{ cm.}$

$$\text{Semi perimeter (s)} = \frac{a+b+c}{2} = \frac{11+7+14}{2} = \frac{32}{2}$$

$$s = 16$$

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{16(16-11)(16-7)(16-14)}$$

$$= \sqrt{16(5)(9)(2)} = 12\sqrt{10} \text{ cm}^2$$

Type - 2

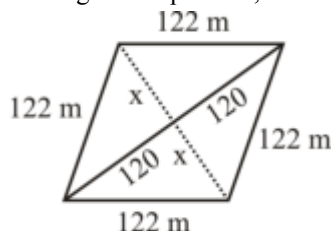
Problems based on Quadrilateral

20. A field is in the shape of a rhombus whose side is 122 m. The length of one of its diagonal's is 240 m. What is the area (in m^2) of the field?

- (a) 1320 (b) 3080
(c) 5280 (d) 1760

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (c) : According to the question,



$$x^2 = 122^2 - 120^2 \text{ (From Pythagoras theorem)}$$

$$= 14884 - 14400$$

$$= 484$$

$$x = 22 \text{ meter}$$

$$\text{Second diagonal (d}_2\text{)} = 2x$$

$$= 2 \times 22$$

$$= 44 \text{ meter}$$

$$\text{Area of rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 240 \times 44 = 5280 \text{ m}^2$$

21. Find the area of a rhombus whose diagonals are 48m and 64m long.

- (a) 1636 sq.m (b) 1536 sq.m
(c) 1436 sq.m (d) 1736 sq.m

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) :

$$\text{Area of rhombus} = \frac{1}{2} \times \text{product of diagonal}$$

$$= \frac{1}{2} \times 48 \times 64$$

$$= 1536 \text{ square meter.}$$

22. The area of a trapezium is 1792 cm^2 and the perpendicular distance between its parallel sides is 28 cm. If the length of one of the parallel sides is 72 cm, then find the length of the other side.

- (a) 64 cm (b) 56 cm
(c) 84 cm (d) 48 cm

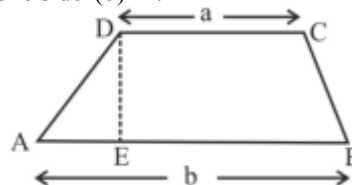
RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (b) : Given,

$$\text{Area of trapezium} = 1792 \text{ cm}^2$$

$$\text{Distance between its parallel sides. (h)} = 28 \text{ cm}$$

$$\text{Length of one side (b)} = ?$$



Now,

$$\text{Area of trapezium} = \frac{1}{2} (a+b) \times h$$

$$1792 = \frac{1}{2} (72+b) \times 28$$

$$256 = (72+b) \times 2$$

$$128 = 72 + b$$

$$b = 128 - 72$$

$$\text{Length of second side (b)} = 56 \text{ cm}$$

24. The area of a rhombus is 440 cm^2 . If the length of one of its diagonals is 20 cm, then what is the length of its other diagonal?

- (a) 22 cm (b) 11 cm
(c) 44 cm (d) 88 cm

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (c) : Area of rhombus = $\frac{1}{2} \times d_1 \times d_2$

$$\frac{1}{2} \times 20 \times d_2 = 440 \text{ cm}^2$$

$$d_2 = 44 \text{ cm}$$

25. In a parallelogram, the altitude is twice the corresponding base, and the area of the parallelogram is 288 m². The altitude of the parallelogram is:

- (a) 12 m (b) 18 m
(c) 36 m (d) 24 m

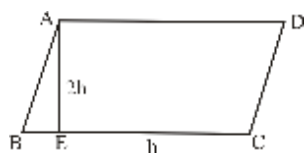
RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (d) : Given:-

$$\text{Area of Parallelogram} = 288 \text{ m}^2$$

$$\text{Let length of base} = h \text{ m}$$

$$\text{Altitude} = 2h \text{ m}$$



$$\text{Altitude of parallelogram} = \frac{\text{Area}}{\text{Base}}$$

$$2h = \frac{288}{h} \text{ m}$$

$$h^2 = 144 \text{ m}$$

$$h = 12 \text{ m}$$

$$\text{Altitude} = 2h = 2 \times 12 = 24 \text{ m}$$

26. Find the area of a rhombus whose perimeter is 164 cm and one diagonal is of length 80 cm.

- (a) 700 cm² (b) 720 cm²
(c) 705 cm² (d) 710 cm²

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given,

$$\text{Diagonal of rhombus (AB)} (d_1) = 80 \text{ cm}$$

$$\text{Perimeter of rhombus} = 164 \text{ cm}$$

$$\therefore \text{Side of rhombus} = \frac{164}{4} = 41 \text{ cm}$$

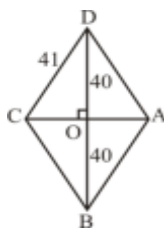
From Pythagoras theorem,

$$OC^2 = (41)^2 - (40)^2$$

$$(OC)^2 = 1681 - 1600 = 81$$

$$OC = \sqrt{81}$$

$$OC = 9 \text{ cm}$$



$$\therefore d_2 = 2 \times OC = 2 \times 9 = 18 \text{ cm}$$

$$\begin{aligned} \text{Hence, area of rhombus} &= \frac{1}{2} d_1 \times d_2 = \frac{1}{2} \times 80 \times 18 \\ &= 80 \times 9 = 720 \text{ cm}^2 \end{aligned}$$

27. What will be the area of a parallelogram with base 44 cm and height 22 cm?

- (a) 978 cm² (b) 958 cm²
(c) 988 cm² (d) 968 cm²

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : Base = 44 cm.

$$\text{Height} = 22 \text{ cm}$$

$$\text{Area of parallelogram} = \text{Base} \times \text{Height}$$

$$= 44 \times 22$$

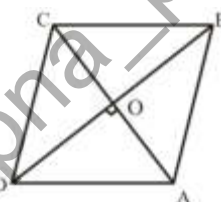
$$= 968 \text{ cm}^2$$

28. What is the area of a rhombus, whose sides are 25 cm and one of the diagonals is 14 cm?

- (a) 336 cm² (b) 310 cm²
(c) 330 cm² (d) 300 cm²

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) :



ABCD is a rhombus in which,

$$AB = BC = CD = DA = 25 \text{ cm}$$

\therefore Diagonals of a rhombus bisect each other at right angle.

$$\therefore AB = 25 \text{ cm}, OA = \frac{14}{2} = 7 \text{ cm}$$

In ΔAOB ,

$$\angle AOB = 90^\circ$$

$$\text{Now, } OB^2 = (AB^2 - OA^2)$$

$$= (25^2 - 7^2) = (625 - 49)$$

$$OB^2 = 576$$

$$\Rightarrow OB = \sqrt{576}$$

$$OB = 24 \text{ cm}$$

$$BD = (2 \times OB)$$

$$BD = 2 \times 24 = 48 \text{ cm}$$

$$\therefore \text{Area of rhombus} = \frac{1}{2} \times AC \times BD$$

$$= \frac{1}{2} \times 14 \times 48$$

$$= 7 \times 48$$

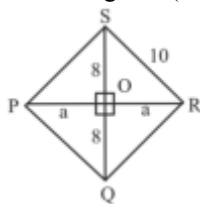
$$= 336 \text{ cm}^2$$

29. Find the area of a rhombus whose side is 10 cm and the longest diagonal is 16 cm.

- (a) 86 cm² (b) 88 cm²
(c) 96 cm² (d) 94 cm²

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (c) : In rhombus PQRS diagonal (SQ) = 16 cm
Suppose second diagonal (RP) = 2a cm



In ΔSOR ,

$$a^2 + (8)^2 = (10)^2$$

$$a^2 + 64 = 100$$

$$a = \sqrt{100 - 64} = \sqrt{36}$$

$$a = 6 \text{ cm}$$

Second diagonal = $2a = 2 \times 6 = 12$

$$\text{Area of rhombus} = \frac{1}{2} d_1 d_2 = \frac{1}{2} \times 16 \times 12 = 96 \text{ cm}^2$$

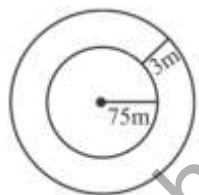
Type - 3 Problems Based on Circle

30. What is the area (in m^2) of a circular path having a uniform width of 3m surrounding a circular field of diameter 150m?

- (a) 453π (b) 447π
(c) 456π (d) 459π

RRB NTPC (Stage-II) –16/06/2022 (Shift-I)

Ans. (d) : According to the question,



$$\text{Area of circle} = \pi r^2$$

$$\text{Area of circular field}$$

$$= (\text{Area of field with circular path}) - (\text{Area of the field})$$

$$= \pi(75 + 3)^2 - \pi(75)^2$$

$$= \pi 78 \times 78 - \pi \times 75 \times 75$$

$$= 459\pi \text{ m}^2$$

31. If diameter of a circle is 16m, then what is the area of the circle?

- (a) $256\pi \text{ m}^2$ (b) $96\pi \text{ m}^2$
(c) $64\pi \text{ m}^2$ (d) $128\pi \text{ m}^2$

RRB NTPC (Stage-II) 15/06/2022 (Shift-II)

Ans. (c) : $2R = 16 \text{ m}$

$$R = 8 \text{ m} \quad \left[\text{Radius}(R) = \frac{\text{Diameter}(D)}{2} \right]$$

$$\text{Area of the circle} = \pi R^2$$

$$= \pi \times 8^2$$

$$= 64\pi \text{ m}^2$$

32. What will be the perimeter of a quarter circle having a radius of 10 cm? [Use $\pi = 3.14$]

- (a) 15.7 cm (b) 35.7 cm
(c) 25.7 cm (d) 51.4 cm

RRB NTPC (Stage-II) –13/06/2022 (Shift-I)

Ans. (b) : Perimeter of quarter circle

$$= \frac{2\pi r}{4} + 2r$$

$$= 2 \times \frac{22}{7} \times \frac{1}{4} \times 10 + 2 \times 10$$

$$= \frac{110}{7} + 20$$

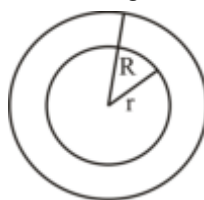
$$= 15.7 + 20 = 35.7 \text{ cm}$$

33. A circular racing track has been developed in a field. If the difference between the outer circumference and the inner circumference of the racing track is 33 m, then find the width of the track (in m) (Use $\pi = \frac{22}{7}$)

- (a) $5\frac{1}{5}$ (b) $4\frac{3}{4}$
(c) $5\frac{3}{4}$ (d) $5\frac{1}{4}$

RRB NTPC (Stage-II) –12/06/2022 (Shift-I)

Ans. (d) : According to the question,



Let the radius of the outer circle be R and the inner circle be r

Now,

$$2\pi (R - r) = 33$$

$$(R - r) = \frac{33 \times 7}{2 \times 22}$$

$$(R - r) = \frac{21}{4} = 5\frac{1}{4}$$

Hence, width of racing track (in m) = $5\frac{1}{4}$

34. An equilateral triangle of side 12 cm is inscribed in a circle. What is the area (in cm^2) of the circle?

- (a) 24π (b) 36π
(c) 18π (d) 48π

RRB NTPC (Stage-II) –13/06/2022 (Shift-II)

Ans. (d) : Side of a equilateral triangle inscribed in circle = 12 cm



then, Radius of circumscribed circle = $\frac{a}{\sqrt{3}}$

$$= \frac{12 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}}$$

$$= 4\sqrt{3}$$

$$\text{Area of circle} = \pi r^2$$

$$= \pi \times 4\sqrt{3} \times 4\sqrt{3}$$

$$= 48\pi$$

35. A man walks around a circular pond exactly once. If his step is 44 cm long and he takes 700 steps to complete one round of the pond, find the area of the pond.

- (a) 7546 m² (b) 6546 m²
(c) 7456 m² (d) 6574 m²

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (a) : According to the question-

$$700 \times 44 = 2\pi r$$

$$r = \frac{700 \times 7 \times 44}{22 \times 2}$$

$$r = 4900 \text{ cm}$$

$$r = 49 \text{ m}$$

Hence, area of the pond = πr^2

$$= \frac{22}{7} \times 49 \times 49$$

$$= 7546 \text{ m}^2$$

36. The area of a circular park is 1386 m². If a path of the width 7 m is laid around and inside the park. Then the area of the path is:

- (a) 760 m² (b) 780 m²
(c) 770 m² (d) 790 m²

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (c) : Area of circular park = 1386 m²

$$\pi r^2 = 1386$$

$$\frac{22}{7} \times r^2 = 1386$$

$$r^2 = \frac{1386 \times 7}{22}$$

$$r = 21 \text{ m}$$

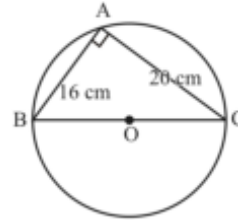
∴ Area of path = Area of larger circular park – Area of smaller circular park

$$= 1386 - \pi(r - 7)^2$$

$$= 1386 - \frac{22}{7}(21 - 7)^2 = 1386 - \frac{22}{7} \times 14 \times 14$$

$$= 1386 - 616 = 770 \text{ m}^2$$

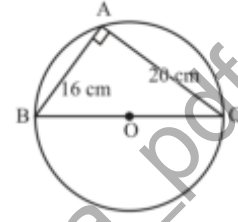
37. Find the area of $\triangle ABC$



- (a) 32 cm² (b) 160 cm²
(c) 320 cm² (d) 240 cm²

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (b) : Given that,



In $\triangle ABC$

$\angle BAC = 90^\circ$ {Angle subtended by a diameter on any point of circumference of circle is 90° }

$$\text{Area of } \triangle ABC = \frac{1}{2} AB \cdot AC \cdot \sin A$$

$$= \frac{1}{2} \times 16 \times 20 \times 1 \quad [\sin 90^\circ = 1]$$

$$= 160 \text{ cm}^2$$

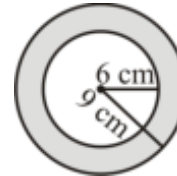
38. Two concentric circles drawn with the radius of inner circle 6 cm and outer circle radius 50% more than inner circle. What is the area of the annulus formed between two circles ?

- (a) $\frac{990}{7}$ cm² (b) $\frac{890}{7}$ cm²
(c) $\frac{900}{7}$ cm² (d) 990 cm²

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (a) Radius of inner circle (r_2) = 6 cm

: Radius of outer circle (r_1) = $6 \times \frac{150}{100} = 9$ cm



$$\text{Area of annulus} = \pi r_1^2 - \pi r_2^2$$

$$= \pi(r_1^2 - r_2^2)$$

$$= \frac{22}{7}(81 - 36)$$

$$= \frac{22}{7} \times 45$$

$$= \frac{990}{7} \text{ cm}^2$$

39. If in a circle of radius $r = 36$ cm a sector of arc length l , satisfies $4l = 3r$, then the area of the sector is:

- (a) 486 cm^2 (b) 461 cm^2
(c) 496 cm^2 (d) 476 cm^2

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) : Given

Radius of circle (r) = 36

$4l = 3r$

$4l = 3 \times 36$ cm

Length of arc (l) = 27 cm

$$\begin{aligned}\text{Area of sector} &= \frac{1}{2} \times \text{Length of arc} \times \text{Radius} \\ &= \frac{1}{2} \times 27 \times 36 \\ &= 27 \times 18 \\ &= 486 \text{ cm}^2\end{aligned}$$

40. If the area of a circle is 154 cm^2 , then the circumference of the circle is:

- (a) 11 cm (b) 44 cm
(c) 36 cm (d) 22 cm

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$\pi r^2 = 154$$

$$r^2 = \frac{154 \times 7}{22} = 49$$

$$r = 7 \text{ cm.}$$

Then the circumference of circle = $2\pi r$

$$= 2 \times \frac{22}{7} \times 7 = 44 \text{ cm.}$$

41. If Circumference and area of a circle are numerically equal then radius of the circle is—

- (a) 4 units (b) 2 units
(c) 1 units (d) 16 units

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (b) : \therefore The circumference of circle = $2\pi r$ and area = πr^2

According to the question,

$$2\pi r = \pi r^2$$

Radius (r) = 2 units

42. The diameter of a wheel is 88 cm. Find the number of revolutions in which it will cover a distance of 8712m.

$$\left(\text{Use } \pi = \frac{22}{7} \right)$$

- (a) 3450 (b) 3250
(c) 3350 (d) 3150

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the number of revolutions = N

Distance = Circumference of wheel \times Number of revolutions

$$\Rightarrow 100 \times 8712 \text{ cm} = 2 \times \frac{22}{7} \times 44 \times N$$

{Circumference of circle = $2\pi r$ }

$$N = \frac{7 \times 8712 \times 100}{44 \times 44} = 3150$$

$$\boxed{N = 3150}$$

43. What is the area of the region swept by the minute hand 6 cm long, of a wall clock, in an interval of 5 minutes?

- (a) 9.43 cm^2 (b) 9.6 cm^2
(c) 9.8 cm^2 (d) 9.63 cm^2

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : The area covered by the minute hand of the wall clock in 60 minutes = πr^2
Where r = length of minute hand

$$\begin{aligned}\therefore \text{Area covered in 5 minutes} &= \frac{5}{60} \pi r^2 \\ &= \frac{5}{60} \times \frac{22}{7} \times 6 \times 6 \\ &= \frac{1}{12} \times \frac{22}{7} \times 36 \\ \text{Hence covered area} &= 9.43 \text{ cm}^2\end{aligned}$$

44. If the outer and inner radii of a circular path are $2a$ and b , then its area is _____ sq. units.

- (a) $(-4a^2 + b^2)$ (b) $\pi (-4a^2 + b^2)$
(c) $(4a^2 - b^2)$ (d) $\pi (4a^2 - b^2)$

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : Area of path = Area of outer part – Area of inner part.

$$= \pi r_1^2 - \pi r_2^2$$

$$= \pi [(2a)^2 - (b)^2]$$

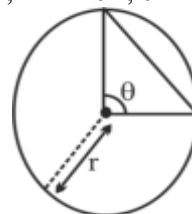
$$= \pi (4a^2 - b^2) \quad \{ \because r_1 = 2a, r_2 = b \}$$

45. A sector is cut off from a circle of radius 21 cm. The angle of the sector is 40° . Find the area of the sector in square cm?

- (a) 145 (b) 154
(c) 156 (d) 144

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given, $r = 21$ cm, $\theta = 40^\circ$



$$\begin{aligned}\text{The area of sector} &= \frac{\pi r^2 \theta}{360^\circ} \\ &= \frac{22 \times 21 \times 21 \times 40^\circ}{7 \times 360^\circ} \\ &= 154 \text{ cm}^2\end{aligned}$$

46. The diameter of circle whose perimeter is 8.8 cm is _____. $\left(\pi = \frac{22}{7}\right)$
- (a) 1.4 cm (b) 5.6 cm.
(c) 2.8 cm (d) 0.28 cm.

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (c) : The perimeter of circle = $2\pi r$

$$2 \times \frac{22}{7} r = 8.8$$

$$2r = \frac{8.8 \times 7}{22}$$

$$2r = 2.8 \text{ cm}$$

Hence the diameter of circle = 2.8 cm

47. A circular land of radius 7 m has 3.5 m wide path around it. Find the area of the path. $\left(\pi = \frac{22}{7}\right)$
- (a) 202 sq. m. (b) 154 sq. m.
(c) 192.5 sq. m. (d) 346.5 sq. m.

RRB NTPC 17.01.2017 Shift-2

Ans : (c) Area of path = Area of land with path – Area of land.

$$= \pi(7 + 3.5)^2 - \pi(7)^2$$

$$= \frac{22}{7} [(10.5 - 7)(10.5 + 7)]$$

$$= \frac{22}{7} \times 17.5 \times 3.5 = 192.5 \text{ m}^2$$

48. If the circumference of a circle is 18π cm, then the area of the circle is:
- (a) 18π sq. cm. (b) $18\pi^2$ sq. cm.
(c) 81π sq. cm. (d) 9π sq. cm.

RRB NTPC 05.04.2016 Shift-1

Ans : (c) Given- Circumference of a circle = 18π

$$2\pi r = 18\pi$$

$$r = \frac{18}{2}$$

$$r = 9 \text{ cm}$$

$$\therefore \text{Area of circle} = \pi r^2$$

$$= \pi \times (9)^2 = 81\pi \text{ square cm}$$

49. If the diameter of a circle is 7 cm then find its area.
- (a) 49 cm^2 (b) 38.5 cm^2
(c) 154 cm^2 (d) 98 cm^2

RRB NTPC 04.04.2016 Shift : 2

Ans : (b) Radius of the circle (r) = $\frac{\text{diameter}}{2}$

$$= \frac{7}{2} \text{ cm}$$

$$\text{Area of circle} = \pi r^2$$

$$= \frac{22}{7} \times \left(\frac{7}{2}\right)^2 = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{2} = 38.5 \text{ cm}^2$$

50. If the circumference of a circle is 22 cm, find the area of the semicircle.
- (a) 38.5 sq.cm. (b) 19.25 sq.cm.
(c) 44 sq.cm. (d) 77 sq.cm.

RRB NTPC 03.04.2016 Shift : 2

Ans : (b) Circumference of the circle = 22 cm

$$2\pi r = 22$$

$$r = \frac{22}{2\pi} = \frac{22 \times 7}{2 \times 22} \quad r = \frac{7}{2} \text{ cm}$$

$$\text{Area of semicircle} = \frac{\pi r^2}{2} = \frac{22 \times 7 \times 7}{2 \times 7 \times 2 \times 2}$$

$$= \frac{11 \times 7}{4} = \frac{77}{4} = 19.25 \text{ square cm.}$$

51. The largest chord of a circle measures 10 cm and the shortest chord measures 4 cm. Find the radius of the circle.
- (a) 20 cm. (b) 5 cm.
(c) 8 cm. (d) 2 cm.

RRB NTPC 29.03.2016 Shift : 2

Ans : (b) Diameter of circle = length of the largest chord of the circle = 10 cm

$$\therefore \text{Radius of circle} = \frac{10}{2} = 5 \text{ cm}$$

52. Find the area of a circular region whose circumference is 22 cm.
- (a) 22 sq. cm. (b) 11 sq. cm.
(c) 44 sq. cm. (d) 38.5 sq. cm.

RRB NTPC 29.03.2016 Shift : 2

Ans : (d) Circumference of a circle = $2\pi r$

From the question-

$$2\pi r = 22$$

$$r = \frac{22}{2 \times \pi}$$

$$r = \frac{22 \times 7}{2 \times 22} \Rightarrow r = \frac{7}{2}$$

$$\therefore \text{Area of circle} = \pi r^2$$

$$= \frac{22}{7} \times \left(\frac{7}{2}\right)^2$$

$$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$$

$$= \frac{77}{2} = 38.5 \text{ square cm.}$$

53. Find the increase in the circumference of the circle of radius 14 cm, if the radius is increased by 7cm. $\left(\pi = \frac{22}{7}\right)$

- (a) 44 cm (b) 22 cm
(c) 66 cm (d) 88 cm

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) Circumference of a circle whose radius is 14 cm = $2\pi r$

$$= 2 \times \frac{22}{7} \times 14 = 88 \text{ cm}$$

When radius is increased by 7 cm

Then radius = $14 + 7 = 21$

$$\text{Perimeter} = 2 \times \frac{22}{7} \times 21 = 132 \text{ cm.}$$

Required increase = $132 - 88 = 44 \text{ cm}$

54. What is the cost of the levelling a circular ground of 28 meters diameter at the rate of ₹ 125 per square meter? ($\pi = 22/7$)

- (a) ₹ 76,000 (b) ₹ 76,400
(c) ₹ 76,800 (d) ₹ 77,000

RRB NTPC 06.04.2016 Shift : 1

Ans : (d) Radius of circular field (r) = $\frac{28}{2} = 14 \text{ m.}$

Area of circular ground = πr^2

$$= \frac{22}{7} \times 14 \times 14 = 616 \text{ m}^2$$

Cost of 1 $\text{m}^2 = ₹ 125$

Cost of 616 $\text{m}^2 = 125 \times 616 = ₹ 77,000$

55. If the radius (r) of a circle is increased by x units, how many units will increase in its circumference?

- (a) π (b) 2π
(c) $2\pi r$ (d) $2\pi x$

RRB NTPC 27.04.2016 Shift : 2

Ans : (d) Radius of circle = r

Increases radius of circle = $r + x$

Increase in circumference of circle

$$= 2\pi(r + x) - 2\pi r$$

Increase in circumference of circle

$$= 2\pi(r + x - r) = 2\pi x$$

56. Read the given information and statement carefully and decide which option is correct with respect to the statement.

If a circle has a radius (r), area (A) and circumference (C), then:

Statement :

(1) $A : C^2 = 1 : 4\pi$

(2) $A : C = r : 2$

- (a) Both statement 1 and 2 are true.
(b) Only statement 2 is true.
(c) Both statement 1 and 2 are false.
(d) Only statement 1 is true.

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,

$$\text{Area (A)} = \pi r^2$$

$$\text{Circumference (C)} = 2\pi r$$

$$\text{From statement-1} = A : C^2 = \pi r^2 : (2\pi r)^2$$

$$A : C^2 = \pi r^2 : 4\pi^2 r^2$$

$$A : C^2 = 1 : 4\pi$$

$$\text{From statement-2} = A : C = \pi r^2 : 2\pi r$$

$$A : C = r : 2$$

Hence, it is clear that statement (1) and statement (2) both are true.

Type - 4 Problems Based on Square

57. The length of a diagonal of a square is 18 cm. What is the perimeter of the square?

- (a) 72 cm (b) $72\sqrt{2}$ cm
(c) 36 cm (d) $36\sqrt{2}$ cm

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (d) : Given,

Diagonal of square = 18 cm

Perimeter of square = ?

$$\text{Square of Diagonal} = a\sqrt{2} = 18$$

$$a = \frac{18 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}}$$

$$\text{Side (a)} = 9\sqrt{2} \text{ cm}$$

Then, Perimeter of square = $4a$

$$= 4 \times 9\sqrt{2}$$

$$= 36\sqrt{2} \text{ cm}$$

58. The sides of two squares are in the ratio 4:3 and the sum of their areas is 225 cm^2 . Find the perimeter of the smaller square (in cm).

- (a) 36 (b) 48
(c) 30 (d) 44

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : Let the sides of two squares are $4x$ and $3x$ respectively

$$\text{Sum of areas} = 225 \text{ cm}^2$$

$$(4x)^2 + (3x)^2 = 225$$

$$16x^2 + 9x^2 = 225$$

$$25x^2 = 225$$

$$x^2 = 9$$

$$x = 3$$

Hence, the perimeter of the smaller square = $3x \times 4$

$$= 3 \times 3 \times 4$$

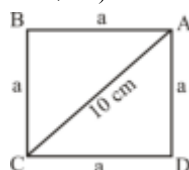
$$= 36 \text{ cm}$$

59. The length of each side of a square whose diagonals are 10 cm each is:

- (a) $10\sqrt{2}$ cm (b) 5 cm
(c) 7 cm (d) $5\sqrt{2}$ cm

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let each side of square = a cm
and diagonal of square (AC) = 10 cm (Given)



In $\triangle ADC$

$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

$$(10)^2 = a^2 + a^2$$

$$100 = 2a^2$$

$$a^2 = 50$$

$$a = \sqrt{50}$$

$$a = \sqrt{25 \times 2}$$

$$\boxed{a = 5\sqrt{2}}$$

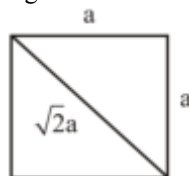
\therefore Each side of square = $5\sqrt{2}$ cm

- 60. A fence is constructed along the diagonal of a square field. What is the length of the fence (in km) if the area of the square field is 2 km^2 ?**

- (a) 2 (b) 5
(c) 4 (d) 3

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (a) : Let the length of sides of square field = a



Area of square field = $a^2 = 2$

$$a = \sqrt{2}$$

Length of diagonals of field = $\sqrt{2}a$

$$= \sqrt{2} \times \sqrt{2}$$

$$= 2$$

- 61. The area of two squares are in the ratio 16:9. Find the ratio of their respective perimeters.**

- (a) 4 : 3 (b) 4 : 5
(c) 5 : 4 (d) 3 : 4

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (a) : Let the area of squares be A_1 and A_2 respectively and sides be a_1 and a_2 respectively.

According to the question-

$$\therefore A_1 : A_2 = 16 : 9$$

$$a_1^2 : a_2^2 = (4)^2 : (3)^2$$

$$a_1 : a_2 = 4 : 3$$

Perimeter of square = $4a$

\therefore Ratio of their perimeters = $4a_1 : 4a_2 = 4 : 3$

- 62. If the side of a square is tripled, then the ratio of the area of the resulting square to that of original square is:**

- (a) 3 : 1 (b) 9 : 1
(c) 9 : 2 (d) 3 : 2

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (b) : From question,

Side of the original square = a

Side of the resulting square = $3a$

$$\frac{\text{Area of square}}{\text{Area of resulting square}} = \frac{a^2}{9a^2}$$

The Ratio of the area of the resultant and the original square = 9 : 1

- 63. A square shaped ground has an area of $10,000 \text{ m}^2$. Find the perimeter of a square which sides are as long as the length of diagonals of initial ground.**

- (a) $400\sqrt{2}$ m (b) 40,000 m
(c) 20,000 m (d) 10,000 m

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (a) : Area of the square shaped ground = $10,000 \text{ m}^2$

$$\text{Side} = \sqrt{10,000} = 100 \text{ m}$$

$$\text{Diagonal of the square} = \text{side} \sqrt{2}$$

$$= 100\sqrt{2} \text{ m}$$

Perimeter of a square whose side is equal to the diagonal of initial ground = $4 \times \text{side}$

$$= 4 \times 100\sqrt{2}$$

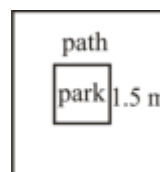
$$= 400\sqrt{2} \text{ m}$$

- 64. A square park is surrounded by a path of uniform width 1.5 m all around it. The area of the path is 225 m^2 . Find the perimeter of the park.**

- (a) 144 m (b) 142 m
(c) 143 m (d) 144.5 m

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (a) :



Area of the path = Area of the square park including the path - Area of the square park.

$$[a + 2(1.5)]^2 - a^2 = 225$$

$$a^2 + 9 + 6a - a^2 = 225$$

$$6a = 216$$

$$a = 36 \text{ m}$$

Perimeter of the square park = $4 \times \text{side} = 4a$

$$= 4 \times 36 = 144 \text{ m}$$

65. The perimeters of five squares are 24 cm, 32 cm, 40 cm, 76 cm and 80 cm respectively. The perimeter of another square whose area is equal to the sum of the areas of these squares will be :

- (a) 128 cm (b) 100 cm
(c) 124 cm (d) 120 cm

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : The perimeters of five squares are 24 cm, 32 cm, 40 cm, 76 cm and 80 cm respectively.

Perimeter = $4 \times \text{side}$

$$a_1 = 6, a_2 = 8, a_3 = 10, a_4 = 19, a_5 = 20$$

$$\text{Area} = (\text{Side})^2$$

Sum of area of all squares

$$= (6)^2 + (8)^2 + (10)^2 + (19)^2 + (20)^2$$

$$= 36 + 64 + 100 + 361 + 400$$

$$\text{Area} = 961 \text{ cm}^2$$

$$(\text{Side})^2 = \text{Area}$$

$$\text{Side} = \sqrt{961} = 31$$

$$\text{Perimeter} = 4 \times \text{side} = 4 \times 31 = 124 \text{ cm}$$

66. If the side of a square is $\frac{1}{10}$ m, then how many such squares will get accommodated in a large square of side 4 m?

- (a) 1500 (b) 1600
(c) 1200 (d) 1650

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b) : Side of small square (a) = $\frac{1}{10}$ m

Side of a large square (a) = 4m

Number of squares in a large square

$$= \frac{(\text{Large side})^2}{(\text{Oneside of small square})^2}$$

$$= \frac{(4)^2}{(1/10)^2} = \frac{16}{1/100}$$

$$= 1600$$

67. The area of a square is 289 cm^2 . Find the length of its diagonal.

- (a) $13\sqrt{2}$ cm (b) $15\sqrt{2}$ cm
(c) $17\sqrt{2}$ cm (d) $19\sqrt{2}$ cm

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let side of square = a cm.

According to the question,

Area of square = $(\text{side})^2$

$$a^2 = 289$$

$$a = 17 \text{ cm.}$$

$$\text{Hence the diagonal of square} = a\sqrt{2} = 17\sqrt{2} \text{ cm.}$$

68. There is square park of size 18m in length. A road of width 3m is constructed outside the square around it. Find the area of the road.

- (a) 352 m^2 (b) 350 m^2
(c) 252 m^2 (d) 250 m^2

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c)

$$\text{Length of park including road} = 18 + 3 + 3 = 24 \text{ m}$$

$$\text{Length of park excluding road} = 18 \text{ m}$$

Area of road = Area of park including road – Area of park

$$= (24)^2 - (18)^2$$

$$= (24 + 18) \times (24 - 18)$$

$$= 42 \times 6 = 252 \text{ m}^2$$

69. The floor of a room is 3 m long and 1 m 50 cm broad. Find the number of the largest possible square slabs which can be used to pave the floor.

- (a) 2 (b) 4
(c) 5 (d) 6

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Length of room = 3m = 300 cm

and, breadth 1m, 50 cm = 100 + 50 = 150 cm

Hence, H.C.F of 300 and 150 = 150

The area of the largest square slab that can be placed in the room = $150 \times 150 \text{ cm}^2$

$$\text{Number of slabs} = \frac{\text{Area of room slab}}{\text{Area of oneslab}}$$

$$= \frac{300 \times 150}{150 \times 150} = 2$$

70. If the length of the diagonal of a square is 20 cm, then what is its perimeter?

- (a) $40\sqrt{2}$ cm (b) $40\sqrt{2}$ m
(c) 0 cm (d) $\sqrt{2}$ cm

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (a) : Diagonal of square = side $\times \sqrt{2}$

$$20 = \text{side} \times \sqrt{2}$$

$$\text{Side} = \frac{20 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}}$$

$$\text{Side} = 10\sqrt{2}$$

$$\text{Perimeter of square} = 4 \times \text{side}$$

$$= 4 \times 10\sqrt{2} = 40\sqrt{2} \text{ cm}$$

71. Manish fixed 48 poles in order to fence a square. If the distance between 2 poles is 5 m, then what will be the area of the square, formed?

- (a) 4000 m^2 (b) 3600 m^2
(c) 3200 m^2 (d) 3500 m^2

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the each side of square be x m.

Perimeter of square = (48×5) m

$$4x = 48 \times 5$$

$$x = \frac{48 \times 5}{4}$$

$$\boxed{x = 60 \text{ m}}$$

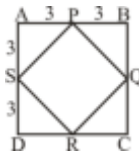
Hence the area of square field = $(\text{Side})^2$
 $= 60^2 = 3600 \text{ m}^2$

72. The area of a square is 36 cm^2 . Find the area of the square formed by joining the mid-points of its sides:

- (a) 20 cm^2 (b) 28 cm^2
 (c) 25 cm^2 (d) 18 cm^2

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

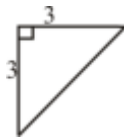
Ans. (d)



Area of square = a^2

$$a^2 = 36$$

$$a = 6$$



$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Height})^2$$

$$(\text{Hypotenuse})^2 = (3)^2 + (3)^2$$

$$\text{Hypotenuse} = 3\sqrt{2}$$

$$\text{Area of PQRS} = (3\sqrt{2})^2$$

$$= 9 \times 2$$

$$= 18 \text{ cm}^2$$

73. 784 square tiles, each of side 50 cm are required to tiles a floor of a square room. Find the length of the sides of the room.

- (a) 15 m (b) 12 m
 (c) 14 m (d) 13 m

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question-

Area of the tiles = $50 \times 50 = 2500 \text{ cm}^2$ or
 $= 0.25 \text{ m}^2$

Area of square shaped room = 784×0.25

$$(\text{side})^2 = 196$$

$$\text{side} = 14 \text{ m}$$

Hence the length of the side of the room is 14 m.

74. Find the area of a square whose diagonal is half of 12 cm.

- (a) 18 sq.cm. (b) 64 sq.cm.
 (c) 36 sq.cm. (d) 72 sq.cm.

RRB NTPC 19.01.2017 Shift : 2

Ans : (a) Diagonal of square = $a\sqrt{2}$ (Where a = side)

As per the question -

$$\frac{12}{2} = a\sqrt{2}$$

$$a = \frac{6}{\sqrt{2}}$$

$$a = \frac{6\sqrt{2}}{2} \quad \boxed{a = 3\sqrt{2}}$$

Area of square = a^2

$$= (3\sqrt{2})^2 = 18 \text{ square cm}$$

Type - 5

Problems Based on Rectangle

75. The length and the breadth of a rectangular park are in the ratio 7 : 3. The perimeter of the park is 21000 m. What is the difference between the length and the breadth of the park?

- (a) 4200 m (b) 3400 m
 (c) 3675 m (d) 3150 m

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (a) : Let the length = $7x$, Breadth = $3x$

According to the question,

The perimeter of the park = 21000 m

$$2(7x + 3x) = 21000$$

$$20x = 21000$$

$$x = 1050$$

Difference between length and breadth

$$= 7x - 3x = 4x = 4 \times 1050 = 4200 \text{ m}$$

76. The area of a rectangular field, whose sides are in the ratio 13 : 5 is 260 m^2 . What is the perimeter of the rectangular field?

- (a) 68 m (b) 70 m
 (c) 72 m (d) 66 m

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,

Let the sides of rectangular field

$$= 13x \text{ and } 5x$$

Area of rectangular field = 260 m^2

$$13x \times 5x = 260$$

$$x^2 = 4$$

$$x = 2 \text{ m.}$$

Perimeter of rectangular field = $2(13x + 5x)$

$$= 2 \times 18x$$

$$= 2 \times 18 \times 2$$

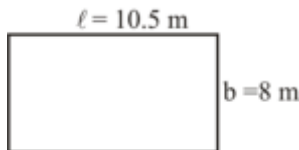
$$= 72 \text{ m.}$$

77. The length and the width of a rectangular plot of land are 10.5 m and 8 m, respectively. Find the cost of laying grass in the entire plot at ₹ 15.25 per square metre.

- (a) ₹ 1,293 (b) ₹ 1,275
 (c) ₹ 1,281 (d) ₹ 1,302

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (c) :



$$\begin{aligned}\text{Area of rectangular plot} &= \ell \times b \\ &= 10.5 \times 8 \\ &= 84 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{The cost of laying grass in the entire plot} &= 84 \times 15.25 \\ &= ₹ 1281\end{aligned}$$

78. The area of a rectangle whose length and width are in the ratio 9:5 is given as 180 cm^2 . Find the perimeter of the rectangle.

- (a) 70 cm (b) 56 cm
(c) 42 cm (d) 54 cm

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (b) : Let the sides of rectangle be $9x$ and $5x$

According to the question,

$$9x \times 5x = 180$$

$$45x^2 = 180$$

$$x^2 = 4$$

$$x = 2$$

Sides of rectangle = $9x$ and $5x$

$$= 9 \times 2 \text{ and } 5 \times 2$$

$$= 18 \text{ cm and } 10 \text{ cm}$$

Then,

$$\begin{aligned}\text{Perimeter of rectangle} &= 2 (\text{length} + \text{breadth}) \\ &= 2 (18 + 10) \\ &= 56 \text{ cm}\end{aligned}$$

79. The diagonal of a rectangular plot is 37 m and its area is 420 m^2 . What is the cost of fencing the plot at ₹ 37.50 per meter?

- (a) ₹ 3,525 (b) ₹ 3,750
(c) ₹ 3,675 (d) ₹ 3,600

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (a) : Diagonal of a rectangular plot = 37

$$\sqrt{\ell^2 + b^2} = 37$$

$$\ell^2 + b^2 = 1369 \text{ ——— (1)}$$

$$\ell b = 420 \text{ ——— (2)}$$

$$(\ell + b)^2 = \ell^2 + b^2 + 2\ell b$$

$$= 1369 + 840 = 2209$$

$$\ell + b = \sqrt{2209} = 47$$

$$\text{Cost of fencing the plot} = 2(\ell + b) \times 37.5$$

$$= 94 \times \frac{75}{2} = ₹ 3525$$

80. The two unequal sides of a rectangle are in the ratio of 3 : 4. If the perimeter is 42 cm , then the length of diagonal will be :

- (a) 35 cm (b) 15 cm
(c) 25 cm (d) 30 cm

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the length of unequal sides of rectangle = $3x$ and $4x$.

According to the question,

$$\text{Perimeter of rectangle} = 42 \text{ cm}$$

$$2(3x + 4x) = 42$$

$$14x = 42$$

$$x = 3$$

Length of unequal sides = 9 cm and 12 cm

$$\begin{aligned}\text{Diagonal of rectangle} &= \sqrt{9^2 + 12^2} \\ &= \sqrt{81 + 144} \\ &= \sqrt{225} \\ &= 15 \text{ cm}\end{aligned}$$

81. A rectangular field is 16 meters long and 12 meters wide. A barbed fence has to be drawn on three sides of the field leaving one side open along the width. What is the cost of fencing at the rate of 25 paise per cm ?

- (a) ₹ 4,400 (b) ₹ 1,100
(c) ₹ 1,900 (d) ₹ 1,600

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) : Length of rectangular field = 16 m

Width of rectangular field = 12 m

According to the question,

$$\text{Perimeter of barbed fence} = 16 + 12 + 16 = 44 \text{ m}$$

The cost of fencing at the rate of 25 paise per cm

$$\begin{aligned}&= 44 \times 100 \times \frac{25}{100} \\ &= ₹ 1100\end{aligned}$$

82. The ratio of the length to the breadth of a rectangular field is $6 : 5$. If the breadth is 25 m less than the length, then perimeter of the field is:

- (a) 550 m (b) 530 m
(c) 540 m (d) 560 m

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the length of the rectangular field = $6x$

Width of the rectangular field = $5x$

According to the question,

$$6x - 5x = 25$$

$$x = 25$$

$$\text{Perimeter of rectangle} = 2(6x + 5x)$$

$$= 22x = 22 \times 25 = 550 \text{ m}$$

83. If the length and the perimeter of a rectangle are in the ratio of $3 : 20$, then its length and breadth will be in the ratio of :

- (a) $3 : 7$ (b) $3 : 6$
(c) $3 : 5$ (d) $3 : 4$

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (a) : We know that
Perimeter of rectangle is $2(l + b)$.

Where,
 l = length of rectangle
 b = breadth of rectangle

As per question,

$$\begin{aligned}\text{Therefore, } \frac{l}{2(l+b)} &= \frac{3}{20} \\ \Rightarrow \frac{l}{l+b} &= \frac{3}{10} \\ \Rightarrow 3l + 3b &= 10l \\ \Rightarrow 7l &= 3b \\ \Rightarrow \frac{l}{b} &= \frac{3}{7}\end{aligned}$$

Hence the ratio of the length and breadth of the rectangle will be $3 : 7$

- 84. Find the cost of carpeting a 15-m-long and 11-m-wide room with a 75cm-wide carpet, if the price of the carpet is ₹13 per meter (Not considering the cost of labour)**

- (a) ₹2,960 (b) ₹2,660
(c) ₹2,860 (d) ₹2,760

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

$$\begin{aligned}\text{Ans. (c) : Area of the room} &= 15 \times 11 \\ &= 165 \text{ m}^2 \\ \text{Width of the carpet} &= 75 \text{ cm} \\ &= \frac{75}{100} \\ &= \frac{3}{4} \text{ m}\end{aligned}$$

Area of the carpet = Area of the room

$$\text{Length} \times \frac{3}{4} = 165$$

$$\text{Length} = \frac{165}{3} \times 4 = 220 \text{ m}$$

Hence, cost of laying a carpet 220 m long at the rate of ₹13 per meter = $220 \times 13 = ₹ 2860$

- 85. Find the perimeter of the rectangle whose length is 5 m more than its breadth, and the value of the perimeter is one thrice of its area.**

- (a) 60 m (b) 50 m
(c) 40 m (d) 45 m

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (b) :

Let, Width of the rectangle = x m

Length = $(x + 5)$ m

$$\begin{aligned}\text{Perimeter of rectangle} &= 2(l+b) \\ &= 2(x + x + 5) \\ &= 2(2x + 5) \\ &= 4x + 10\end{aligned}$$

According to the question,

Perimeter of the rectangle = $\frac{1}{3} \times$ Area of the rectangle

$$\begin{aligned}\text{Hence, } 4x + 10 &= \frac{1}{3} \times (l \times b) \\ (4x + 10) \times 3 &= x \times (x + 5) \\ 12x + 30 &= x^2 + 5x \\ x^2 - 7x - 30 &= 0 \\ x^2 - 10x + 3x - 30 &= 0 \\ x(x - 10) + 3(x - 10) &= 0 \\ (x - 10)(x + 3) &= 0 \\ x - 10 &= 0 \\ \boxed{x = 10}\end{aligned}$$

Perimeter of the rectangle = $2(10 + 15)$
= 50 m

- 86. If p is the length of a rectangle and its width is one-third of its length, then the area of the rectangle will be:**

- (a) p^2 (b) $\frac{p^2}{3}$
(c) $\frac{p^2}{4}$ (d) $\frac{p^2}{5}$

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (b) : Length of rectangle = p

Width of rectangle = $\frac{p}{3}$

Area of rectangle = $l \times b$

$$\begin{aligned}&= p \times \frac{p}{3} \\ &= \frac{p^2}{3}\end{aligned}$$

- 87. The area of a rectangle is 396 cm^2 , and its length and breadth are in the ratio of 11:9. Find its perimeter :**

- (a) 80 cm (b) 50 cm
(c) 60 cm (d) 70 cm

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (a) : Let,

Length of rectangle = $11x$ cm

Breadth of rectangle = $9x$ cm

Area of rectangle = Length \times Breadth

$$396 = 11x \times 9x$$

$$396 = 99x^2$$

$$4 = x^2$$

$$x = 2$$

$$\text{Length} = 11x \Rightarrow 11 \times 2 = 22 \text{ cm}$$

$$\text{Breadth} = 9x \Rightarrow 9 \times 2 = 18 \text{ cm}$$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2(L+B) \\ &= 2(22+18) \\ &= 2 \times 40 \\ &= 80 \text{ cm.}\end{aligned}$$

88. A rectangle has 15 cm as its length and 150 cm^2 as its area. If the area is increased to $1\frac{1}{3}$ times the original area by increasing its length only, then the new perimeter is:

- (a) 60 cm (b) 70 cm
(c) 80 cm (d) 50 cm

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (a) : Area of rectangle = Length \times Breadth

$$150 = 15 \times \text{Breadth}$$

$$\text{Breadth} = 10 \text{ cm}$$

Now, if length is increased by x cm.

$$\text{Again, } (15 + x) \times 10 = 150 \times \frac{4}{3}$$

$$(15 + x) \times 10 = 200$$

$$15 + x = 20$$

$$x = 5$$

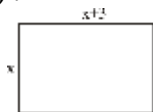
Now, new perimeter of rectangle = $2(20 + 10) = 60 \text{ cm}$

89. A rectangle has a length 3m more than its width and a perimeter numerically equal in value to its area. The integer part of the value of its diagonal is:

- (a) 7 (b) 9
(c) 8 (d) 6

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) :



Let, Breadth = x m

Length = $x + 3$ m

According to the question,

Perimeter of rectangle = Area of rectangle

$$2(x + x + 3) = x(x + 3)$$

$$2(2x + 3) = x^2 + 3x$$

$$4x + 6 = x^2 + 3x$$

$$\Rightarrow x^2 - x - 6 = 0$$

$$\Rightarrow x^2 - 3x + 2x - 6 = 0$$

$$x(x - 3) + 2(x - 3) = 0$$

$$(x - 3)(x + 2) = 0$$

$$x = 3, -2$$

$$\therefore \text{Length} = 3 + 3$$

$$= 6 \text{ m}$$

$$\text{Breadth} = 3 \text{ m}$$

$$\text{Diagonal} = \sqrt{\text{Length}^2 + \text{Breadth}^2}$$

$$= \sqrt{36 + 9}$$

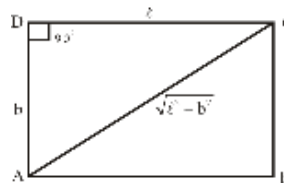
$$= \sqrt{45} = 6.7 = 6 \text{ (Integer part).}$$

90. The area of a rectangle is 60 sq. units and its perimeter is 34 units then find its diagonal :

- (a) 12 units (b) 17 units
(c) 13 units (d) 14 units

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,



Given,

$$\text{Perimeter of rectangle} = 2(l + b) = 34$$

$$l + b = 17$$

$$\text{Area of rectangle} = lb = 60$$

$$\text{Diagonal (AC)} = \sqrt{l^2 + b^2}$$

$$AC = \sqrt{(l + b)^2 - 2lb}$$

$$AC = \sqrt{(17)^2 - 2 \times 60}$$

$$AC = \sqrt{289 - 120}$$

$$AC = \sqrt{169}$$

$$AC = 13 \text{ units}$$

91. The breadth of a rectangular plot of land is one-third of its length. If the perimeter of the plot is 240 m, then what is the length of the plot?

- (a) 95 m (b) 70 m
(c) 90 m (d) 60 m

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the length of the rectangular plot = ℓ meters

And breadth = b meters

According to the question,

$$b = \frac{\ell}{3}$$

$$\text{Perimeter of rectangular plot} = 2(\ell + b)$$

$$240 = 2\left(\ell + \frac{\ell}{3}\right)$$

$$240 = 2\left(\frac{4\ell}{3}\right)$$

$$\ell = \frac{240 \times 3}{2 \times 4}$$

$$\boxed{\ell = 90 \text{ m}}$$

Hence the length of the plot = 90 m

92. If the length of a rectangular solar panel having an area of 110 m^2 is 10% more than its breadth, then what will be the breadth?

- (a) $20\sqrt{3} \text{ m}$ (b) 10 m
(c) $10\sqrt{3} \text{ m}$ (d) 110 m

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) : Let breadth (b) = x m.

According to the question,

$$\text{Length } (l) = \frac{110x}{100}$$

$$= \frac{11}{10}x$$

Area of rectangular solar panel = lb

$$lb = 110$$

$$\frac{11}{10}x^2 = 110$$

$$x^2 = 100$$

$$x = 10$$

Therefore breadth of solar panel = 10 m.

- 93. The length of a rectangle is $\frac{3}{5}$ of the radius of a circle. The radius of a circle is equal to the side of a square whose area is 4900 m^2 . what is the area of the rectangle if its breadth is 20m.**

- (a) 840 m^2 (b) 880 m^2
(c) 480 m^2 (d) 860 m^2

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let the side of square be 'a' meter and the radius of circle be 'r' meter

According to the question

$$\text{Area of square } (a^2) = 4900 \text{ m}^2$$

$$a = 70 \text{ m}$$

\therefore Radius of circle (r) = 70 m

$$\text{Length of Rectangle} = \text{Radius of circle} \times \frac{3}{5}$$

$$= 70 \times \frac{3}{5} \quad (\because r = a)$$

$$= 42 \text{ m}$$

$$\text{Area of Rectangle} = \text{Length} \times \text{Breadth}$$

$$= 42 \times 20$$

$$= 840 \text{ m}^2$$

- 94. In a rectangle, the length is twice the breadth and the perimeter of the rectangle is 48 cm. The area of the rectangle is:**

- (a) 288 cm^2 (b) 512 cm^2
(c) 128 cm^2 (d) 144 cm^2

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (c) : Let the breadth of rectangle = x cm

\therefore Length = 2x cm

$$\text{Perimeter of rectangle} = 2 (\text{length} + \text{breadth})$$

$$48 = 2 (x + 2x)$$

$$48 = 2 \times 3x$$

$$\text{Breadth } (x) = 8 \text{ cm}$$

$$\text{Length } (2x) = 16 \text{ cm}$$

$$\text{Area of rectangle} = \text{Length} \times \text{Breadth}$$

$$= 16 \times 8 = 128 \text{ cm}^2$$

- 95. The ratio of the perimeter to the length of a rectangle is 5 : 1. If the area of the rectangle is 216 cm^2 , then the length of the rectangle (in cm) is:**

- (a) 12 cm (b) 18 cm
(c) 14 cm (d) 16 cm

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (a) :

Let the length of rectangle is x cm and perimeter is 5x cm.

$$2 \times \text{Width} = \text{Perimeter} - 2l$$

$$= 5x - 2x$$

$$\text{Width} = \frac{3x}{2}$$

$$\text{Area} = \text{Length} \times \text{Width} = 216 \text{ cm}^2$$

$$x \times \frac{3x}{2} = 216$$

$$3x^2 = 216 \times 2$$

$$x^2 = 72 \times 2$$

$$x = 12 \text{ cm}$$

Hence, length of rectangle (x) = 12 cm.

- 96. A square of the side 2 m inside a rectangle of length 5 m and breadth 2 m is shaded. What is the ratio of the area of the shaded square and the area of the unshaded region of the rectangle?**

- (a) 3 : 2 (b) 2 : 3
(c) 5 : 2 (d) 2 : 5

RRB NTPC 17.01.2017 Shift-2

Ans : (b) Area of rectangle = $5 \times 2 = 10 \text{ m}^2$

$$\text{Area of shaded square} = 2 \times 2 = 4 \text{ m}^2$$

$$\text{Area of unshaded region of the rectangle} = 10 - 4 = 6 \text{ m}^2$$

Required ratio = Area of shaded square : Area of unshaded region of the rectangle

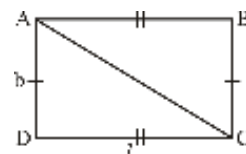
$$\text{Required ratio} = 4 : 6 = 2 : 3$$

- 97. The length of the diagonal of a rectangle and its semi-perimeter are 11 cm and 13 cm respectively. Find the area of the rectangle.**

- (a) 12 square cm. (b) 48 square cm.
(c) 36 square cm. (d) 24 square cm.

RRB NTPC 05.04.2016 Shift-1

Ans : (d)



Given—

$$\text{Semi perimeter } (l + b) = 13 \text{ cm. (i)}$$

$$\text{Diagonal of rectangle } (\sqrt{l^2 + b^2}) = 11 \text{ cm}$$

$$\Rightarrow l^2 + b^2 = 121 \text{ cm}$$

$$l = \text{length, } b = \text{breadth}$$

$$\Rightarrow (l+b)^2 - 2lb = 121 \quad \text{From equation (i)}$$

$$\Rightarrow (13)^2 - 2lb = 121$$

$$\Rightarrow 2lb = 169 - 121 = 48$$

$$\Rightarrow lb = 48/2$$

$$\Rightarrow lb = 24 \text{ square cm.}$$

Area of rectangle = 24 square cm.

98. The perimeter of a rectangle is 28 cm. If its one side is 4 cm then find other side of the rectangle.

- (a) 24 cm (b) 7 cm
(c) 10 cm (d) 8 cm

RRB NTPC 04.04.2016 Shift : 1

Ans : (c) Let the length of the other side be = x cm
 \therefore Perimeter of rectangle = 28 cm
 $2 \times (x + 4) = 28$
 $x + 4 = 14$
 $x = 10 \text{ cm.}$

99. The area of a rectangle is 42 cm² and its length is 7 cm. Find its perimeter.

- (a) 14 cm. (b) 21 cm.
(c) 26 cm. (d) 24 cm.

RRB NTPC 03.04.2016 Shift : 2

Ans : (c) Area of rectangle = $\ell \times b = 42$
 $7 \times b = 42$
 $b = 6 \text{ cm.}$
 Perimeter of rectangle = $2(\ell + b)$
 $= 2(7 + 6) = 2 \times 13 = 26 \text{ cm.}$

100. The length of a rectangle is 6 times its breadth. If the perimeter of a rectangle is 56 cm then find the area of the rectangle.

- (a) 48 square cm. (b) 96 square cm.
(c) 144 square cm. (d) 64 square cm.

RRB NTPC 03.04.2016 Shift : 3

Ans : (b) Let the width of the rectangle be = x cm
 Then length of rectangle = 6x cm
 \therefore Perimeter of rectangle = $2(\ell + b)$
 $56 = 2(x + 6x) \quad 28 = 7x$
 $x = 4$
 So area of rectangle = $\ell \times b = 6x \times x$
 $= 6x^2 = 6(4)^2 = 6 \times 16 = 96 \text{ square cm}$

101. The perimeter of a rectangle and its diagonal are 34 cm and 13 cm respectively. Find its area

- (a) 987 square cm. (b) 240 square cm.
(c) 120 square cm. (d) 60 square cm.

RRB NTPC 31.03.2016 Shift : 1

Ans : (d) If the length and breadth of a rectangle will be ℓ cm and b cm respectively.

Diagonal of rectangle = 13 cm

$$\sqrt{\ell^2 + b^2} = 13$$

$$\ell^2 + b^2 = 169 \dots\dots (1)$$

\therefore Perimeter of rectangle = 34 cm

$$2(\ell + b) = 34$$

$$\ell + b = 17 \dots\dots (2)$$

$$\therefore (\ell + b)^2 = \ell^2 + b^2 + 2\ell b$$

$$(17)^2 = 169 + 2\ell b$$

$$289 - 169 = 2\ell b$$

$$2\ell b = 120$$

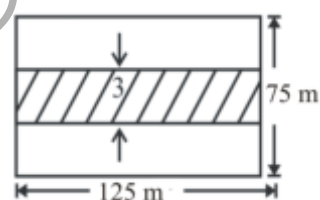
$$\therefore \text{Area of rectangle} = 60 \text{ cm}^2.$$

102. The length of a rectangular field is 125 m and breadth is 75 m. There is a 3 m wide footpath in the middle of the field. What is the area of the field without the footpath?

- (a) 9375 square m. (b) 9000 square m.
(c) 9750 square m. (d) 8625 square m.

RRB NTPC 31.03.2016 Shift : 2

Ans : (b)



Area of field without footpath
 $= 125 \times 75 - 125 \times 3$
 $= 125 \times (75 - 3)$
 $= 125 \times 72$
 $= 9000 \text{ square m.}$

103. What is the length of diagonal, if area of a rectangle is 168 cm² and breadth is 7 cm?

- (a) 24 cm (b) 15 cm
(c) 17 cm (d) 25 cm

RRB NTPC 30.03.2016 Shift : 1

Ans : (d) \therefore Area of rectangle = 168 square cm
 \therefore Length \times Breadth = 168
 As per the question,
 $7 \times \text{Length} = 168$
 $\text{Length} = \frac{168}{7} = 24 \text{ cm}$
 \therefore Length of diagonal = $\sqrt{\ell^2 + b^2}$
 $= \sqrt{(24)^2 + (7)^2}$
 $= \sqrt{576 + 49} = \sqrt{625} = 25 \text{ cm.}$

104. The perimeter of a rectangle is 28 cm. If the length is $\frac{5}{2}$ times of the breadth, then find the length and breadth of the rectangle.

- (a) 90 and 5 (b) 10 and 4
(c) 6 and 7 (d) 11 and 3

RRB NTPC 29.03.2016 Shift : 1

Ans : (b) As per the question,

$$\text{length of rectangle} = \frac{5}{2} \times \text{Breadth}$$

$$\text{Perimeter of rectangle} = 28$$

$$2(L + B) = 28$$

$$\left(\frac{5}{2}B + B\right) = \frac{28}{2} = 14$$

$$\frac{7}{2}B = 14 \Rightarrow B = 4 \text{ cm}$$

$$\therefore L = \frac{5}{2} \times 4 = 10 \text{ cm}$$

So length and breadth of rectangle is 10 cm and 4 cm.

105. The length of a rectangular board is 4 times its breadth, if the area of the board is 256 sq. m, then find its length?

- (a) 8 m (b) 16 m
(c) 24 m (d) 32 m

RRB NTPC 18.01.2017 Shift : 1

Ans : (d) Let the breadth = b m

$$l = 4b, \quad \text{Area} = 256 \text{ sq.m}$$

$$\therefore 4b \times b = 256$$

$$b^2 = 64, b = 8$$

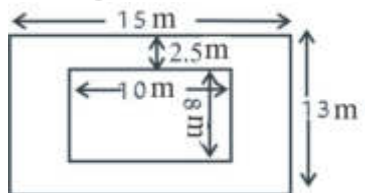
$$\therefore l = 4b = 4 \times 8 = 32 \text{ m}$$

106. A footpath of 2.5 m breadth is built around a rectangular garden having a length of 10 m and breadth of 8 m. Find the area of the garden which includes the footpath.

- (a) 130.25 square m. (b) 131.25 square m.
(c) 195.00 square m. (d) 162.50 square m.

RRB NTPC 06.04.2016 Shift : 1

Ans : (c)



$$\text{Area of the garden which includes the footpath} = 15 \times 13 = 195 \text{ square meter}$$

107. The one side of a rectangle is 12 m and its diagonal is 13 m, then find its area.

- (a) 60 m^2 (b) 55 m^2
(c) 50 m^2 (d) 45 m^2

RRB NTPC 06.04.2016 Shift : 2

Ans : (a) In triangle ABC

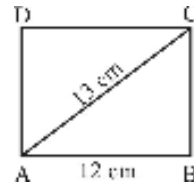
$$AC^2 = AB^2 + BC^2$$

$$(13)^2 = (12)^2 + BC^2$$

$$BC^2 = 169 - 144$$

$$BC = \sqrt{25}$$

$$BC = 5 \text{ m.}$$



$$\text{Area of rectangle} = AB \times BC = 12 \times 5 = 60 \text{ m}^2$$

108. Find the length of the diagonal of a rectangle whose length and breadth are 6 cm and 6 cm respectively.

- (a) $6\sqrt{2}$ (b) $\pm 6\sqrt{2}$
(c) 0 (d) $\sqrt{2}$

RRB NTPC 26.04.2016 Shift : 3

Ans : (a)

$$\text{Diagonal of rectangle} = \sqrt{(\text{length})^2 + (\text{breadth})^2}$$

$$= \sqrt{(6)^2 + (6)^2} = \sqrt{36 + 36} = \sqrt{6 \times 6 \times 2} = 6\sqrt{2}$$

109. The area of a rectangle is 448 sq. m. If its length is 12% more than its breadth, then find its breadth.

- (a) 14m (b) 16m
(c) 18m (d) 20m

RRB NTPC 27.04.2016 Shift : 2

Ans : (d)

$$\text{Let the breadth} = x$$

$$\text{Length} = \frac{x \times 112}{100} = \frac{112x}{100}$$

$$\text{Area of rectangle} = \text{length} \times \text{breadth}$$

$$448 = \frac{x \times 112x}{100}$$

$$\Rightarrow x^2 = \frac{448 \times 100}{112}$$

$$x^2 = 400$$

$$x = 20$$

$$\text{So breadth} = 20 \text{ m}$$

110. Find the maximum area of a rectangular field which is surrounded by a rope of 400 m

- (a) 5000 m^2 (b) 6250 m^2
(c) 4000 m^2 (d) 10000 m^2

RRB NTPC 27.04.2016 Shift : 3

Ans : (d) We know that the area of a rectangle will be maximum when the length of the rectangle is equal to its width

$$\therefore \text{For maximum area}$$

$$2(L + B) = 400 \quad (\because L = B)$$

$$\text{Length} = \frac{400}{4} = 100 \text{ m}$$

$$\text{Area} = \text{length} \times \text{breadth} = 100 \times 100 = 10,000 \text{ m}^2$$

111. Find the maximum area of a rectangular field enclosed by a 40 m long rope?

- (a) 160 m^2 (b) 180 m^2
(c) 200 m^2 (d) 100 m^2

RRB NTPC 30.04.2016 Shift : 2

Ans : (d) Let the length = a

breadth = b

According to the question,

$$2(a + b) = 40$$

$$a + b = 20$$

$\therefore ab = \text{maximum}$

$$\therefore a = 10, b = 10$$

$$\text{So maximum area of field} = ab = 10 \times 10 = 100 \text{ m}^2$$

Type - 6 Problems Based on Cube

112. The length of each edge of a cube is 2.6 cm. What is the total surface area (in cm^2) of the cube?

- (a) 40.76 (b) 40.56
(c) 39.96 (d) 40.36

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : Total surface area of a Cube = $6a^2$
 $= 6 \times (2.6)^2$
 $= 6 \times 6.76 = 40.56 \text{ cm}^2$

113. The cost of painting a cube on all the external surfaces at the rate of ₹2/ cm^2 is ₹588. Find the volume of the cube (in cm^3).

- (a) 343 (b) 512
(c) 216 (d) 274.625

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (a) : Surface area of a cube = $\frac{\text{cost of paintings}}{2}$

$$6a^2 = \frac{588}{2}$$

$$6a^2 = 294$$

$$a^2 = \frac{294}{6}$$

$$a^2 = 49$$

$$a = 7$$

Volume of the cube = a^3
 $= (7)^3$
 $= 343 \text{ cm}^3$

114. The space diagonal of a cube measures $8\sqrt{3}$ cm. What is the volume of the cube?

- (a) 1536 cm^3 (b) $512\sqrt{3} \text{ cm}^3$
(c) 512 cm^3 (d) $1536\sqrt{3} \text{ cm}^3$

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

Length of diagonal of a cube = $a\sqrt{3}$

$$8\sqrt{3} = a\sqrt{3}$$

$$a = 8 \text{ cm}$$

\therefore Volume of cube = a^3

$$= 8^3$$

$$= 512 \text{ cm}^3$$

115. The total surface area of a cube of side measuring 2 m is:

- (a) 30 m^2 (b) 25 m^2
(c) 20 m^2 (d) 24 m^2

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (d) : Side of cube (a) = 2m

Total surface area of cube = $6a^2$

$$= 6 \times (2)^2$$

$$= 24 \text{ m}^2$$

116. If the diagonal of a cube is $10\sqrt{3}$ cm long, then what is its volume?

- (a) 1000 cm^3 (b) 800 cm^3
(c) 500 cm^3 (d) 9000 cm^3

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$a\sqrt{3} = 10\sqrt{3} \Rightarrow a = 10 \text{ cm.}$$

So, volume of cube = $(a^3) = (10)^3 = 1000 \text{ cm}^3$

117. If the side of a cube is $9\sqrt{3}$ cm, then its diagonal will be :

- (a) 28 cm (b) 26 cm
(c) 27 cm (d) 29 cm

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Diagonal of cube = side $\times \sqrt{3}$

\therefore Side = $9\sqrt{3}$ [Given that]

\therefore Diagonal of cube = $9\sqrt{3} \times \sqrt{3}$

$$= 9 \times 3$$

$$= 27 \text{ cm}$$

118. A larger cube is formed by melting of three smaller cubes of sides 3 cm, 4 cm and 5 cm each. The ratio of the surface area of the three smaller cubes to the larger cube is.

- (a) 9 : 4 (b) 18 : 25
(c) 25 : 18 (d) 27 : 64

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,
 $(3)^3 + (4)^3 + (5)^3 = A^3$
 $27 + 64 + 125 = A^3$
 $216 = A^3$
 $A = 6 \text{ cm}$

Surface area of larger cube $= 6A^2$
 $= 6 \times (6)^2$
 $= 216 \text{ cm}^2$

Sum of the surface area of three smaller cubes
 $= 6(3^2 + 4^2 + 5^2)$
 $= 6(9 + 16 + 25)$
 $= 300 \text{ cm}^2$

Hence Required ratio $= \frac{300}{216} = 25 : 18$

119. The ratio of the volumes of two cubes is 64 : 1331. What is the ratio of their total surface areas?

- (a) 16 : 121 (b) 121 : 16
 (c) 16 : 4 (d) 4 : 121

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) : Let sides of both cubes are a and b respectively.

According to the question,

$$\frac{a^3}{b^3} = \frac{64}{1331} = \frac{(4)^3}{(11)^3} \Rightarrow \frac{a}{b} = \frac{4}{11}$$

The ratio of their total surface area,

$$\begin{aligned} &= \frac{6a^2}{6b^2} = \frac{a^2}{b^2} \\ &= \left(\frac{a}{b}\right)^2 = \left(\frac{4}{11}\right)^2 \\ &= \frac{16}{121} \Rightarrow 16 : 121 \end{aligned}$$

120. If length of each side of a cube is doubled, then its volume the original volume

- (a) Is doubled (b) Becomes 9 times
 (c) Becomes 8 times (d) Becomes 6 times

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let the side of the initial cube $= a$

Volume of the initial cube $= a^3$

Length of each side of the cube $= 2a$

$$\text{Volume} = (2a)^3 = 8a^3$$

Volume $= 8 \times$ Initial cube/volume of the original cube.

So, if the length of each side of the cube is doubled. Then its volume will become 8 times of the original volume.

121. Each edge of a cube is increased by 50%. Find the percentage increase in its surface area

- (a) 130% (b) 100%
 (c) 125% (d) 120%

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : Increase in surface area $= (a + b + \frac{ab}{100})\%$
 $= 50 + 50 + \frac{50 \times 50}{100}$

$= 100 + 25$
 $= 125\%$

or

Let side of cube $= a \text{ cm.}$

and surface area $= 6a^2 \text{ cm}^2$

\therefore side of new cube $= a \times \frac{150}{100}$

$$= \frac{3a}{2} \text{ cm.}$$

$$\begin{aligned} \text{Surface area} &= 6 \times \left(\frac{3a}{2}\right)^2 \\ &= 6 \times \frac{9a^2}{4} = \frac{27a^2}{2} \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \therefore \text{Increase \% in surface area} &= \frac{\frac{27a^2}{2} - 6a^2}{6a^2} \times 100 \\ &= \frac{15}{12} \times 100 = 125\% \end{aligned}$$

Type - 7

Problems Based on Cuboid

122. Rajesh needs to buy some cardboard to build a box that is 12 inches long, 8 inches wide and 10 inches high. How much cardboard is needed to build the box?

- (a) 350 sq inches (b) 960 sq inches
 (c) 400 sq inches (d) 592 sq inches

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (d) : Cardboard required to make a box,

$$= 2(lb + bh + lh)$$

$$= 2(12 \times 8 + 8 \times 10 + 10 \times 12)$$

$$= 2(96 + 80 + 120)$$

$$= 2 \times 296$$

$$= 592 \text{ square inches}$$

123. Rohan had a cuboidal box having dimensions of 36 cm \times 25 cm \times 20 cm. He packed into it as many cubes as possible. Each of which has edges 4 cm long. How much space will be still left in the box?

- (a) 820 cm^3 (b) 720 cm^3
 (c) 780 cm^3 (d) 680 cm^3

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (b) : Volume of cuboid = $36 \times 25 \times 20$
 $= 18000 \text{ cm}^3$

Total possible number of small cubes = $(36 \times 25 \times 20) \text{ cm}^3$

$$\begin{aligned} &\therefore (24 \text{ cm because that} \\ &\text{is the max dimension of} \\ &\text{the cube of 4 cm that can} \\ &\text{cover for space of 25 cm}) \\ &= \frac{36}{4} \times \frac{24}{4} \times \frac{20}{4} \\ &= 9 \times 6 \times 5 \\ &= 270 \end{aligned}$$

$$\begin{aligned} \text{Total volume of small cubes} &= 270 \times (4)^3 \\ &= 270 \times 64 \\ &= 17280 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Remaining part} &= 18000 - 17280 \\ &= 720 \text{ cm}^3 \end{aligned}$$

124. The ratio of the length, breadth and height of a cuboid is 4 : 3 : 5 and the sum of the lengths of all its edges is 144 cm. Find the total surface area of the cuboid.

- (a) 756 cm^2 (b) 846 cm^2
 (c) 1026 cm^2 (d) 1620 cm^2

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (b) : Let Length of Cuboid = $4x$

Breadth = $3x$

Height = $5x$

According to the question,

$$4(4x+3x+5x) = 144$$

$$4 \times 12x = 144, \quad x = 3$$

Then surface area of cuboid = $2(lb + bh + hl)$

$$= 2(12+15+20)x^2$$

$$= 2 \times 47x^2$$

$$= 94 \times 9$$

$$= 846 \text{ cm}^2$$

125. If the length and the height of a cuboid are 18 m and 12 m respectively and its volume is 3024 m^3 , then find its breadth:

- (a) 16 (b) 14
 (c) 13 (d) 15

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (b) : Length of Cuboid (l) = 18 m

Height (h) = 12 m

Volume = 3024 m^3

Breadth (b) = ?

Volume = $l \times b \times h$

$$3024 = 18 \times b \times 12$$

$$b = \frac{3024}{18 \times 12}$$

$$b = 14 \text{ m}$$

126. 500 persons are taking a dip in a cuboidal pond, which is 80 m long and 50 m broad. What is the rise in the water level in the pond, if the average displacement of the water by one person is 0.04 m^3 ?

(a) 2.5 cm

(b) 1 cm

(c) 1.5 cm

(d) 0.5 cm

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (d) :

If the height of the pond is h m.

Volume of pond

$$= l \times b \times h$$

$$= 80 \times 50 \times h$$

$$= 4000 h \text{ m}^3$$

Volume of water removed by 500 persons

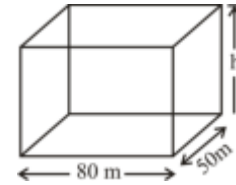
$$= 500 \times 0.04 = 20.00 \text{ m}^3 = 20 \text{ m}^3$$

Therefore, the rise in the water level of the pond

$$\therefore (1 \text{ m} = 100 \text{ cm})$$

$$4000 h = 20$$

$$h = \frac{20}{4000} = 0.005 \text{ m} = 0.5 \text{ cm}$$



127. How many cubes of side 3 cm can be formed by melting a cuboid of length 9 cm, breadth 6 cm and height 6 cm?

- (a) 14 (b) 12
 (c) 13 (d) 11

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (b) : Required number of cubes

$$= \frac{\text{Volume of cuboid}}{\text{Volume of cube}} = \frac{lbh}{a^3} = \frac{9 \times 6 \times 6}{3 \times 3 \times 3} = 12$$

128. A tank 4 m long, 2 m wide and 1.5 m deep is dug in a field 22 m long and 14 m wide. If the earth dug out is evenly spread out over the remaining field, then the level of the field will rise by:

- (a) 4.75 m (b) 5 cm
 (c) 3.5 cm (d) 4 cm

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the level of the field be increased by h m.

Volume of dug soil = Area of remaining field \times height.

$$4 \times 2 \times 1.5 = (22 \times 14 - 4 \times 2) \times h$$

$$12 = 4(75) \times h$$

$$h = \frac{12}{300} \text{ m}$$

$$h = \frac{12}{300} \times 100$$

$$h = 4 \text{ cm}$$

129. A cuboid having the surface area of 3 adjacent faces as a , b , c has the volume:

- (a) $(abc)^{\frac{1}{2}}$ (b) $a^3 b^3 c^3$
 (c) abc (d) $(abc)^{\frac{1}{3}}$

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (a) : Given,

$$\text{Length} \times \text{Breadth} = a \text{ (i)}$$

$$\text{Breadth} \times \text{Height} = b \text{ (ii)}$$

$$\text{Height} \times \text{Length} = c \text{ (iii)}$$

On multiplying equation (i), (ii) and (iii),

$$(L \times B \times H)^2 = a \times b \times c$$

$$\text{Hence, Volume} = \text{Length} \times \text{Breadth} \times \text{Height} = (abc)^{\frac{1}{2}}$$

130. The length of the longest pole, that could be placed in a room of dimensions 10 m, 8 m and 6 m, is:

- (a) 18 m (b) 15 m
(c) $10 \times \sqrt{2}$ m (d) 14 m

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (c) : The length of the longest pole

$$= \sqrt{10^2 + 8^2 + 6^2}$$

$$= \sqrt{200}$$

$$= 10\sqrt{2} \text{ m}$$

131. Find the length of the longest pole that can be placed in a room of dimensions 30m × 15m × 10m.

- (a) 31 m (b) 35 m
(c) 33 m (d) 18 m

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (b) : Given—

Length of the room (l) = 30 m

Breadth (b) = 15 m

Height (h) = 10 m

Diagonal of room is the length of longest pole

$$\Rightarrow \text{Diagonal} = \sqrt{l^2 + b^2 + h^2}$$

$$= \sqrt{30^2 + 15^2 + 10^2}$$

$$= \sqrt{900 + 225 + 100}$$

$$= \sqrt{1225}$$

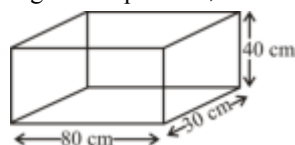
$$= 35 \text{ m}$$

132. An aquarium is in the form of a cuboid whose external measure are 80 cm × 30 cm × 40 cm. The base, side faces and back face are to be covered with a paper. Find the area of the paper needed?

- (a) 6000 cm² (b) 8080 cm²
(c) 8000 cm² (d) 8050 cm²

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,



Required area of paper = Area of base + Area of 2 faces + Area of back face

$$= (80 \times 30) + 2(30 \times 40) + (80 \times 40)$$

$$= 2400 + 2400 + 3200 = 8000 \text{ cm}^2$$

133. A closed wooden rectangular box is made of one cm thick wood whose outer dimensions are as follows length 22cm, breadth 17cm and height 12cm. It is completely filled with cement what will be the amount of cement in the box?

- (a) 1488 cube cm (b) 3000 cube cm
(c) 4488 cube cm (d) 2880 cube cm

RRB NTPC 02.04.2016 Shift : 2

Ans : (b) Length of the wood = 22 cm

Breadth = 17 cm

Height = 12 cm

Rectangular wood is 1 cm thick

So, length of cement = $22 - 2 = 20$ cm

Breadth = $17 - 2 = 15$ cm

Height = $12 - 2 = 10$ cm

Quantity of cement = $20 \times 15 \times 10 = 3000$ cube cm

Type - 8

Problems Based on Cylinder

134. The circumference of the base of a right circular cylinder is 176 cm and its height is 12 cm. Find the total surface area (in cm²) of the cylinder. (Use $\pi = \frac{22}{7}$)

- (a) 7064 (b) 7640 (c) 7040 (d) 7460

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (c) : Circumference of base of cylinder = 176 cm

$$2\pi r = 176$$

$$2 \times \frac{22}{7} \times r = 176$$

$$r = 28 \text{ cm}$$

$$h = 12 \text{ cm}$$

Total surface area of cylinder = $2\pi r(r+h)$

$$= 176 \times (28+12)$$

$$= 176 \times 40 = 7040 \text{ cm}^2$$

135. Find the cost of painting all surfaces of a 10 m long hollow steel pipe whose internal and external diameters measure 15 cm and 17 cm respectively, if the cost of painting 1cm² of the surface is ₹0.15. [Use $\pi = \frac{22}{7}$]

- (a) ₹15,160.80 (b) ₹15,100.80
(c) ₹15,200.80 (d) ₹15,000.80

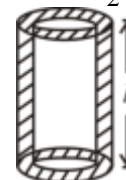
RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) : Given,

$$R = \frac{17}{2} \text{ cm,}$$

$$r = \frac{15}{2} \text{ cm,}$$

$$l = 1000 \text{ cm}$$



Total surface area of Hollow cylinder.

$$= 2\pi(R+r)l + 2\pi(R^2 - r^2)$$

$$= 2\pi(R+r)(l+R-r)$$

$$= 2 \times \frac{22}{7} \times 16 \times (1000+1)$$

$$= 2 \times 22 \times 16 \times 143 \text{ cm}^2$$

$$\text{Cost of painting} = 2 \times 22 \times 16 \times 143 \times 0.15 = 15100.8 \text{ cm}^2$$

136. The sum of the radius of the base and the height of a solid right circular cylinder is 39 cm. Its total surface area is 1716cm^2 . What is the Volume (in cm^3) of the cylinder? (Take $\pi = \frac{22}{7}$)

$$\pi = \frac{22}{7}$$

- (a) 4620 (b) 5082
(c) 4774 (d) 4928

RRB NTPC (Stage-II) 15/06/2022 (Shift-II)

Ans. (d) : Let the radius and height of the cylinder is R and H respectively.

According to the question,

Total surface area of cylinder = 1716

$$2\pi R(H + R) = 1716 \quad (\because H + R = 39\text{cm})$$

$$2 \times \frac{22}{7} \times R \times 39 = 1716$$

$$R = \frac{1716 \times 7}{39 \times 2 \times 22}$$

$$R = 7\text{ cm}$$

Volume of cylinder = $\pi R^2 H$

$$= \frac{22}{7} \times 7 \times 7 \times 32 \quad [H = 39 - 7 = 32]$$

$$= 4928\text{cm}^3$$

137. Two cylinders have the same volume, but the radius of the base of the second cylinder is 20% less than the radius of the base of the first. How much greater should the height of the second cylinder be in comparison to the height of the first?

- (a) 55.25% (b) 56.25%
(c) 55.75% (d) 56.75%

RRB NTPC (Stage-II) 15/06/2022 (Shift-I)

Ans. (b) : Let radius of first cylinder (R) = 100

$$\text{Radius of second cylinder (r)} = 100 \times \frac{80}{100} = 80$$

According to the question,

$$\pi R^2 H = \pi r^2 h$$

$$\Rightarrow (100)^2 \times H = (80)^2 \times h$$

$$\Rightarrow \frac{H}{h} = \frac{6400}{10,000}$$

$$\text{Required increase \%} = \frac{(10000 - 6400) \times 100}{6400}$$

$$= \frac{3600 \times 100}{6400}$$

$$= \frac{225}{4}$$

$$= 56.25\%$$

138. If the radius and height of a cylinder are 25 cm and 42 cm respectively, then its lateral surface area is:

- (a) 660 cm^2 (b) 1960 cm^2
(c) 6000 cm^2 (d) 6600 cm^2

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (d) : Given—

Radius of cylinder (r) = 25 cm

Height (h) = 42 cm

Lateral surface area of cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 25 \times 42 = 44 \times 150 = 6600\text{cm}^2$$

139. If the radius of two cylinders are in ratio 2:3 and their respective heights are in ratio 5:3 then what is the ratio of their volumes?

- (a) 10 : 17 (b) 20 : 27
(c) 20 : 37 (d) 17 : 27

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (b) : Ratio of volumes = $\frac{r^2 h}{R^2 H} = \left(\frac{r}{R}\right)^2 \times \frac{h}{H}$

$$= \left(\frac{2}{3}\right)^2 \times \frac{5}{3} = 20 : 27$$

140. In a right circular cylinder, the ratio of curved surface area to total surface area is 3:7. Find the ratio of height to radius of the cylinder.

- (a) 4 : 5 (b) 5 : 3
(c) 4 : 3 (d) 3 : 4

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : Curved surface area of cylinder = $2\pi rh$

Total surface area of cylinder = $2\pi r(h+r)$

According to the question,

$$\frac{2\pi rh}{2\pi r(h+r)} = \frac{3}{7}$$

$$7h = 3h + 3r$$

$$4h = 3r$$

$$\frac{h}{r} = \frac{3}{4}$$

$$h : r = 3 : 4$$

141. A cylinder has 14 cm height and 660 cm^2 curved surface area. The volume of the cylinder is:

(Take $\pi = \frac{22}{7}$)

- (a) 2425 cm^3 (b) 2275 cm^3
(c) 2475 cm^3 (d) 2225 cm^3

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$h = 14 \text{ cm}$$

$$\text{Curved surface area of cylinder} = 2\pi rh$$

$$660 = 2 \times \frac{22}{7} \times r \times 14$$

$$r = \frac{660}{88}$$

$$= \frac{60}{8}$$

$$= 7.5 \text{ cm}$$

$$\text{Volume of the cylinder} = \pi r^2 h$$

$$= \frac{22}{7} \times 7.5 \times 7.5 \times 14$$

$$= 2475 \text{ cm}^3$$

142. If the radius of a cylinder is 5 cm, its vertical height is 172 cm, what will be the volume?

- (a) $1500\pi \text{ cm}^3$ (b) $4300\pi \text{ cm}^3$
(c) $1000\pi \text{ cm}^3$ (d) $4100\pi \text{ cm}^3$

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (b) : As per the question,

$$\text{Radius of cylinder (r)} = 5 \text{ cm}$$

$$\text{Height of cylinder (h)} = 172 \text{ cm}$$

$$\begin{aligned} \therefore \text{Volume of cylinder} &= \pi r^2 h \\ &= \pi \times 5^2 \times 172 \\ &= 4300\pi \text{ cm}^3 \end{aligned}$$

143. The capacity of a cylindrical tank is 6160 m³. If the diameter of base of the tank is 28m, then find the depth (in m) of the tank.

- (a) 12 (b) 10
(c) 14 (d) 8

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (b) : $\therefore \text{Volume of cylinder} = \pi r^2 h$

$$\text{Radius (r)} = \frac{\text{Diameter}}{2}$$

$$= \frac{28}{2}$$

$$\boxed{r = 14 \text{ m}}$$

According to the question –

$$\pi r^2 h = 6160 \text{ m}^3$$

$$\frac{22}{7} \times 14 \times 14 \times h = 6160$$

$$h = \frac{6160 \times 7}{14 \times 14 \times 22}$$

$$\boxed{h = 10 \text{ m}}$$

144. In a right circular cylinder, the ratio of the curved surface area to the total surface area is 5:9. Find the ratio of the height of the cylinder to the radius of the cylinder.

- (a) 3 : 5 (b) 5 : 3
(c) 4 : 5 (d) 5 : 4

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : Curved surface area of the cylinder $= 2\pi rh$

$$\text{The total surface area of the cylinder} = 2\pi r(h + r)$$

$$\frac{\text{Curved surface area of cylinder}}{\text{Total surface area of cylinder}} = \frac{5}{9}$$

$$\frac{2\pi rh}{2\pi r(h + r)} = \frac{5}{9}$$

$$\Rightarrow \frac{h}{h + r} = \frac{5}{9}$$

$$\Rightarrow 9h = 5h + 5r$$

$$9h - 5h = 5r$$

$$\frac{h}{r} = \frac{5}{4}$$

145. A cylinder has a height of 14 cm and the curved surface area is 528 cm². The volume of the cylinder is :

- (a) 1244 cm³ (b) 1584 cm³
(c) 2538 cm³ (d) 792 cm³

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : Height of cylinder (h) = 14 cm

$$\text{Curved surface area of cylinder (} 2\pi rh) = 528 \text{ cm}^2$$

$$\Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 528$$

$$\Rightarrow r = \frac{528}{2 \times 2 \times 22}$$

$$r = 6 \text{ cm}$$

$$\text{Volume of cylinder (} \pi r^2 h) = \frac{22}{7} \times 6 \times 6 \times 14$$

$$= 22 \times 36 \times 2$$

$$= 1584 \text{ cm}^3$$

146. What will be the volume of an perpendicular cylinder if its radius is 2.5 cm and height is 2 cm.

- (a) 275 cm³ (b) 275/21 cm³
(c) 275/2 cm³ (d) 275/7 cm³

RRB NTPC 19.01.2017 Shift : 1

Ans : (d) Volume of cylinder $= \pi r^2 h$

$$= \frac{22}{7} \times (2.5)^2 \times 2$$

$$= \frac{275}{7} \text{ cm}^3$$

147. What is the volume of a perpendicular cylinder whose radius is 2 cm and height is 2 cm.

$$\left(\pi = \frac{22}{7}\right)$$

- (a) $175/7 \text{ cm}^3$ (b) $176/21 \text{ cm}^3$
(c) $176/7 \text{ cm}^3$ (d) 176 cm^3

RRB NTPC 19.01.2017 Shift : 3

Ans : (c) Volume of cylinder $= \pi r^2 h = \frac{22}{7} \times 2 \times 2 \times 2$
 $= \frac{22}{7} \times 8 = \boxed{\frac{176}{7} \text{ cm}^3}$

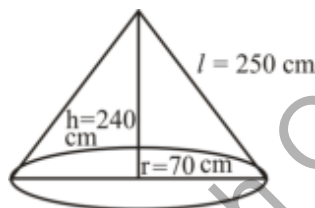
Type - 9 Problems Based on Cone

148. Find the total surface area (in cm^2) of a right circular cone whose radius of base is 70 cm and perpendicular height is 240 cm. [Use $\pi = \frac{22}{7}$]

- (a) 704 (b) 0.704
(c) 7.04 (d) 70400

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (d) : Given,
radius (r) = 70 cm
height (h) = 240 cm



Then, $l^2 = h^2 + r^2$
 $= (240)^2 + (70)^2$
 $l = \sqrt{62500}$
 $l = 250 \text{ cm}$

Total surface area of cone $= \pi r(l + r)$
 $= \frac{22}{7} \times 70(250 + 70)$
 $= \frac{22}{7} \times 70 \times 320$
 $= 70400 \text{ cm}^2$

149. The slant height of a right circular cone is 13 cm and the area of the base is $144\pi \text{ cm}^2$. Find the volume (in cm^3) of the cone.

- (a) 245π (b) 260π
(c) 240π (d) 225π

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (c) : Given,

Slant height of cone (ℓ) = 13 cm

Area of base $= 144\pi \text{ cm}^2$

$$\pi r^2 = 144\pi \text{ cm}^2$$

$$r^2 = 144$$

Radius (r) = 12 cm

Height (h) $= \sqrt{\ell^2 - r^2}$

$$= \sqrt{13^2 - 12^2}$$

$$= \sqrt{25}$$

$$\therefore h = 5 \text{ cm}$$

Volume of cone $= \frac{\pi r^2 h}{3}$

$$= \frac{\pi \times (12)^2 \times 5}{3}$$

$$= \pi \times 12 \times 4 \times 5 = 240\pi$$

150. The area of the base of a conical tomb is 616 m^2 and its height is 48 m. What is the cost of plastering in curved surface area at ₹ 150 per m^2 ? (Take $\pi = \frac{22}{7}$)

- (a) ₹ 3,60,000 (b) ₹ 3,15,000
(c) ₹ 3,00,000 (d) ₹ 3,30,000

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (d) :



Area of base of cone $= 616 \text{ m}^2$
 $\pi r^2 = 616$

$$\frac{22}{7} \times r^2 = 616$$

$$r^2 = 7 \times 7 \times 4$$

$$r = 14 \text{ m}$$

$$l = \sqrt{h^2 + r^2}$$

$$= \sqrt{48^2 + 14^2}$$

$$= \sqrt{2500}$$

$$= 50 \text{ m}$$

Required cost $= \pi r l \times 150 = \frac{22}{7} \times 14 \times 50 \times 150$
 $= ₹ 330,000$

151. The radius of the base of a solid right circular cone is 5 cm and its height is 12 cm. What is its total surface area (in cm^2)?

- (a) 34π (b) 90π
(c) 84π (d) 70π

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (b) : Given,
 Radius (r) = 5 cm
 Height (h) = 12 cm
 Slant-Height (l) = $\sqrt{5^2 + 12^2}$
 $= \sqrt{169}$
 $= 13$ cm
 Total surface area of cone = $\pi r (l + r)$
 $= \pi \times 5 \times 18$
 $= 90\pi$

- 152. The diameter of base of a right circular cone is 20 cm and its slant height is 10.5 cm. What is the curved surface area (in cm^2) of the right circular cone? [Use $\pi = \frac{22}{7}$]**
- (a) 165 cm^2 (b) 660 cm^2
 (c) 495 cm^2 (d) 330 cm^2

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (d) : Given,
 Diameter of cone = 20 cm
 Radius (r) = $\frac{20}{2} = 10$ cm
 Slant height (l) = 10.5 cm
 Curved surface area of cone = $\pi r l$
 $= \frac{22}{7} \times 10 \times 10.5$
 $= 330 \text{ cm}^2$

- 153. The height of the solid frustum of a cone is 8 cm. If the radii of its lower and upper ends are 3 cm and 9 cm respectively, then its slant height is:**
- (a) 10 cm (b) 12 cm
 (c) 15 cm (d) 9 cm

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (a) : Given that—
 Height of frustum (h) = 8 cm
 Radius of upper end (R) = 9 cm
 Radius of lower end (r) = 3 cm
 Slant height (l) = $\sqrt{h^2 + (R - r)^2}$
 $= \sqrt{8^2 + (9 - 3)^2}$
 $= \sqrt{64 + 36}$
 $= \sqrt{100}$
 $= 10$ cm

- 154. Calculate the total surface area of a cone if its radius is $\frac{r}{4}$ and slant height is 4l.**
- (a) $\pi r(l+r)$ (b) $2\pi r(l+r)$
 (c) $\pi r \left(l + \left(\frac{r}{16} \right) \right)$ (d) $2\pi r l$

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (c) : Given,
 radius (r) = $\frac{r}{4}$
 Slant height l = 4l
 Total surface area of cone = $(\pi r l + \pi r^2)$
 $= \pi \frac{r}{4} \times 4l + \pi \left(\frac{r}{4} \right)^2$
 $= \pi r l + \pi \frac{r^2}{16}$
 $= \pi r \left(l + \frac{r}{16} \right)$

- 155. Find the total surface area of a cone, if its radius and slant height are 2r and 1/2 respectively.**

- (a) $\pi r (2r + 1)$ (b) $\frac{4r^2 + 1}{2}$
 (c) $\pi r (4r + 1)$ (d) $\pi (4r^2 + 1)$

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (c) : Total surface area of cone = $\pi r l + \pi r^2$
 Where, r = Radius
 l = Slant height
 So, total surface area of a cone whose radius (2r) and slant height $\left(\frac{1}{2} \right)$
 $\Rightarrow \pi \times 2r \times \frac{1}{2} + \pi (2r)^2$
 $\Rightarrow \pi r + \pi 4r^2$
 $\Rightarrow \pi r (1 + 4r)$
 $\Rightarrow \pi r (4r + 1)$

Type - 10

Problems Based on Sphere/Hemisphere

- 156. The surface area of a sphere is 38.5 cm^2 . Find the radius of the sphere. [Use $\pi = \frac{22}{7}$]**
- (a) 1.8 cm (b) 1.4 cm
 (c) 1.5 cm (d) 1.75 cm

RRB NTPC (Stage-II) 15/06/2022 (Shift-II)

Ans. (d) : Surface area of sphere = 38.5
 $4\pi R^2 = 38.5$
 $R^2 = \frac{38.5}{4 \times \frac{22}{7}}$ [Surface area of sphere = $4\pi R^2$]
 $R^2 = \frac{38.5 \times 7}{4 \times 22} = \frac{7 \times 7}{4 \times 4}$
 $R = \frac{7}{4} = 1.75$ cm

157. A hemispherical bowl of internal radius 24 cm is full of liquid. This liquid is to be filled in cylindrical bottles, each of internal radius 6 cm and height 8 cm. How many bottles are required to empty the bowl?

(a) 32 (b) 36
(c) 35 (d) 30

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (a) : Number of bottles required to completely empty the hemispherical bowl

$$= \frac{\text{Volume of the hemispherical bowl}}{\text{Volume of cylindrical bottle}}$$

$$= \frac{\frac{2}{3}\pi r^3}{\pi r^2 h}$$

$$= \frac{\frac{2}{3} \times 24 \times 24 \times 24}{6 \times 6 \times 8}$$

$$= 2 \times 4 \times 4$$

$$= 32$$

Hence, 32 bottles will be required to completely empty the hemispherical bowl.

158. The total surface area of a solid hemisphere is 1848 cm². What is the length of the diameter of the flat surface of the hemisphere. [Use $\pi = \frac{22}{7}$]

(a) 35 cm (b) 21 cm
(c) 14 cm (d) 28 cm

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (d) : According to the question,

$$\text{Total surface area of solid Hemisphere} = 3\pi r^2$$

$$3\pi r^2 = 1848 \text{ cm}^2$$

$$\Rightarrow r^2 = \frac{1848}{3\pi}$$

$$\Rightarrow r^2 = \frac{1848 \times 7}{3 \times 22}$$

$$\Rightarrow r^2 = 196$$

$$\Rightarrow r^2 = (14)^2$$

$$\therefore \text{Radius } (r) = 14$$

$$\text{Diameter} = 2r$$

$$= 2 \times 14$$

$$= 28 \text{ cm}$$

159. If three solid gold spherical beads of radii 6 cm, 8 cm, and 10 cm, respectively are melted into one spherical bead, then what is the radius (in cm) of the larger bead?

(a) 15 cm (b) 12 cm
(c) 13 cm (d) 16 cm

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (b) : Radius of larger spherical bead = Sum of volumes of smaller spherical beads

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3$$

$$R^3 = (6)^3 + (8)^3 + (10)^3$$

$$= 216 + 512 + 1000$$

$$= \sqrt{1728}$$

$$R = 12 \text{ cm.}$$

160. The total surface area of a hemisphere is 108π cm². What is the volume of the hemisphere?

(a) 216π cm³ (b) 108√6π cm³
(c) 144π cm³ (d) 54√3π cm³

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : Total surface area of hemisphere = 108π cm²

$$3\pi r^2 = 108\pi$$

$$r^2 = 36$$

$$r = 6 \text{ cm}$$

$$\text{Now, the volume of hemisphere} = \frac{2}{3}\pi r^3$$

$$= \frac{2}{3} \times \pi \times 6 \times 6 \times 6$$

$$= 144\pi \text{ cm}^3$$

161. What is the ratio of the surface areas of two spheres, if their volumes are in the ratio 8 : 27?

(a) 8 : 27 (b) 2 : 3
(c) 4 : 3 (d) 4 : 9

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (d) : As per the question,

$$\text{Ratio of volumes of spheres} = \frac{8}{27}$$

$$\frac{\frac{4}{3}\pi R_1^3}{\frac{4}{3}\pi R_2^3} = \frac{8}{27}$$

$$\frac{R_1}{R_2} = \frac{2}{3}$$

$$\text{Hence, ratio of surface areas} = \frac{4\pi R_1^2}{4\pi R_2^2} = \frac{R_1^2}{R_2^2} = \frac{4}{9}$$

$$= 4 : 9$$

162. What is the ratio of volumes of two spheres where the curved surface areas are in the ratio of 1 : 4?

(a) 8 : 13 (b) 1 : 4
(c) 1 : 8 (d) 8 : 1

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (c) : Curved surface area of sphere = $4\pi r^2$

Let, radius of small sphere = r_1

Radius of large sphere = r_2

According to the question,

Then,

$$\frac{\text{Curved surface area of small sphere}}{\text{Curved surface area of large sphere}} = \frac{1}{4}$$

$$\frac{4\pi r_1^2}{4\pi r_2^2} = \frac{1}{4}$$

$$\frac{r_1}{r_2} = \frac{1}{2}$$

$$\frac{\text{Volume of small sphere}}{\text{Volume of large sphere}} = \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{1}{8}$$

Hence, Required ratio = 1 : 8

163. If the volume of sphere is given as 4851 cm³, then find its diameter?

$$\left[\text{Use } \pi = \frac{22}{7} \right]$$

- (a) 42 cm (b) 21 cm
(c) 28 cm (d) 10.5 cm

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (b) : \therefore Volume of sphere = $\frac{4}{3}\pi r^3$

$$\frac{4}{3} \times \frac{22}{7} \times r^3 = 4851$$

$$r^3 = \frac{441 \times 21}{4 \times 2}$$

$$r^3 = \frac{21 \times 21 \times 21}{2 \times 2 \times 2}$$

$$r = \frac{21}{2}$$

$$\text{Diameter } (2r) = \frac{21}{2} \times 2 = 21 \text{ cm}$$

164. A solid sphere of surface area S, is cut into four equal pieces by two radial planes. The total surface area of all the pieces?

- (a) Becomes S (b) Becomes 4S
(c) Becomes 2S (d) Becomes 3S

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (c) : On cutting the solid sphere vertically and horizontally, the surface area equal to four circles will increase and the radius of those circles will also be equal to the radius of solid sphere.

$$\text{Hence, the surface area of the solid sphere} = 4\pi r^2$$

$$S = 4\pi r^2$$

$$\text{The total surface area of the four pieces after making the vertical and horizontal cuts} = 4\pi r^2 + 4\pi r^2$$

$$= 8\pi r^2 = 2 \times 4\pi r^2 = 2S$$

165. What would be the surface area of a solid sphere its radius is 1.5 cm.? ($\pi = \frac{22}{7}$)

- (a) 190/21 (b) 190/7
(c) 198/7 (d) 198/21

RRB NTPC 19.01.2017 Shift : 1

Ans : (c) Surface area of solid sphere = $4\pi r^2$

$$r = 1.5 \text{ cm.}, \quad \pi = \frac{22}{7}$$

$$= 4 \times \frac{22}{7} \times (1.5)^2 = \frac{198}{7} \text{ square cm.}$$

166. Find the area of a solid sphere whose radius is 2 cm. (Given $\pi = \frac{22}{7}$)

- (a) 352/7 (b) 350/21
(c) 352/21 (d) 350/7

RRB NTPC 19.01.2017 Shift : 3

Ans : (a) Area of sphere = $4\pi r^2 = 4 \times \frac{22}{7} \times (2)^2$

$$= \frac{16 \times 22}{7} = \frac{352}{7} \text{ cm}^2$$

Type - 11 Miscellaneous

167. A lawn in the shape of a rectangle has an area of 7260 m² and its sides are in the ratio 5 : 3, Its perimeter is equal to the perimeter of a circular garden. What is the area of the circular garden? (Take $\pi = \frac{22}{7}$)

- (a) 7260 m² (b) 9878 m²
(c) 9856 m² (d) 8712 m²

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,

Let, the sides of rectangular lawn,

$$= 5x, 3x$$

Area of rectangular lawn = 7260

$$\Rightarrow 5x \times 3x = 7260$$

$$\Rightarrow x^2 = 484$$

$$\Rightarrow x = 22 \text{ m.}$$

Perimeter of rectangular lawn = Circumference of circular garden

$$\Rightarrow 2(5x + 3x) = 2\pi r$$

$$\Rightarrow 2 \times 8 \times 22 = 2 \times \frac{22}{7} \times r$$

$$\Rightarrow r = 56 \text{ m.}$$

$$\therefore \text{Area of circular garden} = \pi r^2$$

$$= \frac{22}{7} \times 56 \times 56$$

$$= 9856 \text{ m}^2$$

168. The length of each side of a regular hexagon is $2\sqrt{3}$ cm. What is the area of the given hexagon?

- (a) 54 cm² (b) $18\sqrt{3}$ cm²
(c) 18 cm² (d) $24\sqrt{3}$ cm²

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (b) : Given,

The length of each side of a regular hexagon = $2\sqrt{3}$ cm.

According to the question,

$$\begin{aligned}\text{Area of hexagon} &= \frac{3\sqrt{3}a^2}{2} \\ &= \frac{3\sqrt{3} \times (2\sqrt{3})^2}{2} = \frac{3\sqrt{3} \times 12}{2} \\ &= 18\sqrt{3} \text{ cm}^2\end{aligned}$$

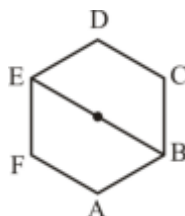
169. ABCDEF is a regular hexagon and $m(\overline{BE}) = 14$ cm. What is the perimeter of the hexagon?

- (a) 42 cm (b) 30 cm
(c) 48 cm (d) 36 cm

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (a) : Given, hexagon- A B C D E F

$m(\overline{BE}) = 14$ cm



$$\begin{aligned}\text{then side} &= \frac{14}{2} \\ &= 7 \text{ cm}\end{aligned}$$

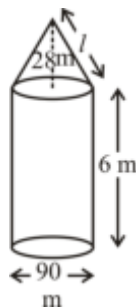
$$\begin{aligned}\text{Hence, Perimeter of hexagon} &= 6 \times \text{side} \\ &= 6 \times 7 \\ &= 42 \text{ cm}\end{aligned}$$

170. A tent is cylindrical upto a height of 6 m and conical above it. The diameter of the base is 90 m and the height of the conical part is 28 m. What is the area (in m^2) of canvas used in making it?

- (a) 2925π (b) 2905π
(c) 2895π (d) 2940π

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (a) :



$$\text{Diameter (D)} = 90 \text{ m}$$

$$\text{Radius (r)} = \frac{90}{2} = 45 \text{ m}$$

$$\begin{aligned}\text{Slant height of cone (l)}^2 &= h^2 + r^2 \\ &= (45)^2 + (28)^2 \\ &= \sqrt{2025 + 784} \\ &= \sqrt{2809} \\ &= 53\end{aligned}$$

Area of canvas used = curved surface area of cylinder + curved surface area of cone

$$\begin{aligned}&2\pi rh + \pi rl \\ &= \pi r (2h + l) \\ &= \pi \times 45 (12 + 53) \\ &= \pi \times 45 \times 65 \\ &= 2925 \pi \text{ m}^2\end{aligned}$$

171. Two regular polygons have the same number of sides. Their lengths are in the ratio 7 : 5 and the area of the larger polygon is 1127 cm^2 . Find the area of the smaller polygon.

- (a) 565 cm^2 (b) 585 cm^2
(c) 575 cm^2 (d) 550 cm^2

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (c) :

$$\therefore \frac{\text{Area of larger polygon (A}_1\text{)}}{\text{Area of smaller polygon (A}_2\text{)}} = \frac{(a_1)^2}{(a_2)^2}$$

$$\frac{1127}{A_2} = \frac{(7)^2}{(5)^2}$$

$$A_2 = \frac{1127 \times 5 \times 5}{49}$$

$$A_2 = 23 \times 5 \times 5$$

$$A_2 = 575 \text{ cm}^2$$

Hence, Area of smaller polygon = 575 cm^2

172. If the base of a cylinder is the same as that of a cone, and the height of the cylinder is also the same as that of the cone, then find the ratio of the volumes of the cylinder and the cone.

- (a) 1 : 3 (b) 2 : 3
(c) 3 : 2 (d) 3 : 1

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,

Let, the base of the cylinder and the cone = d

Then, radius = $d/2 = r$ (Let)

And, height = h (Let)

So,

$$\frac{\text{Volume of cylinder}}{\text{Volume of cone}} = \frac{\pi r^2 h}{\frac{1}{3} \pi r^2 h}$$

Hence, required ratio = 3:1

173. A cuboid of 6 cm long, 4 cm width and 4 cm height melted. How many cubes of each 2 cm side can be made?

- (a) 14 (b) 16
(c) 12 (d) 18

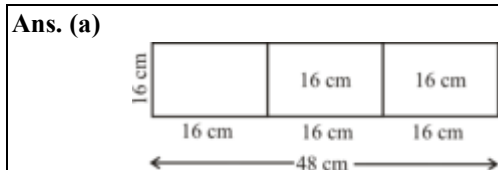
RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (c) : Volume of Cuboid = $l \times b \times h$
 $= 6 \times 4 \times 4 = 96$
 Volume of a cube = $a^3 = 2^3 = 8$
 Then, the number of cubes = $\frac{\text{Volume of cuboid}}{\text{Volume of a cube}}$
 $= \frac{96}{8} = 12$ cubes

174. 3 cubes each with side 16 cm are joined side by side in a line. Find the surface area of the cuboid so formed.

- (a) 3584 cm² (b) 3588 cm²
(c) 3600 cm² (d) 3564 cm²

RRB NTPC 30.01.2021 (Shift-I) Stage Ist



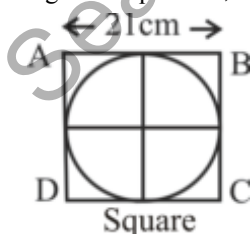
\therefore Surface area of cuboid = $2(lb + bh + hl)$
 $= 2(48 \times 16 + 16 \times 16 + 16 \times 48)$
 $= 2(48 \times 16 + 48 \times 16 + 256)$
 $= 2(1536 + 256)$
 $= 2 \times 1792$
 $= 3584$ cm²

175. The area of the greatest circle that can be inscribed inside a square of side 21 cm is:

- (a) 351.5 cm² (b) 350.5 cm²
(c) 346.5 cm² (d) 347 cm²

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,



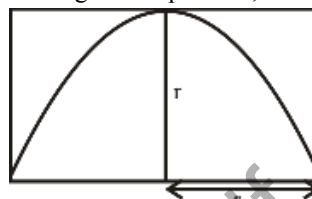
\therefore Radius = $\frac{\text{Diameter}}{2} = \frac{\text{Side of square}}{2}$
 $= \frac{21}{2} = 10.5$ cm
 \therefore Area of circle = πr^2
 $= \frac{22}{7} \times 10.5 \times 10.5$
 $= 346.5$ cm²

176. The area of semicircle is 1250π cm² inscribed inside a rectangle. The diameter of the semicircle coincides with the length of the rectangle. The area of the rectangle is:

- (a) 4000 cm² (b) 3000 cm²
(c) 2000 cm² (d) 5000 cm²

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question,



Length of rectangle = $2r$

Width of rectangle = r

Area of rectangle = Length \times Width

$$= 2r \times r$$

$$= 2r^2$$

Again, According to the question, $\frac{\pi r^2}{2} = 1250\pi$

$$r^2 = 2500$$

$$r = 50$$

Area of rectangle = $2r^2 = 2 \times (50)^2 = 5000$ cm²

177. A few lead spheres of diameter 6 cm are dropped into a cylindrical beaker containing some water such that they are fully submerged. If the diameter of the beaker is 9 cm and the water level has risen by 32 cm, find the number of lead spheres dropped into the beaker.

- (a) 16 (b) 14
(c) 18 (d) 15

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let number of lead spheres is n .

Radius of beaker = $\frac{\text{Diameter}}{2} = \frac{9}{2}$ cm

Radius of each sphere = $\frac{6}{2} = 3$ cm

According to the question

(Volume of Sphere $\times n$ = The volume of risen water in cylindrical beaker).

$$\frac{4}{3} \pi r_1^3 \times n = \pi r_2^2 h$$

$$\frac{4}{3} \pi (3)^3 \times n = \pi (9/2)^2 \times 32$$

$$n = \frac{81}{4} \times 32 \times \frac{3}{4} \times \frac{1}{27}$$

$$n = 9 \times 2$$

$$\boxed{n = 18}$$

178. The radius of a sphere 'r', is equal to the radius of the base of a right circular cylinder. The total volume of these two solids = $\frac{7}{3}\pi r^3$. If 'h' is the height of the cylinder. Find $\frac{h}{r}$.
- (a) 1 (b) 1.5
(c) 3 (d) 2

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (a) : Volume of sphere = $\frac{4}{3}\pi r^3$

Volume of cylinder = $\pi r^2 h$

Total volume of both solid = $\frac{7}{3}\pi r^3$

or $\frac{4}{3}\pi r^3 + \pi r^2 h = \frac{7}{3}\pi r^3$

$\frac{7}{3}\pi r^3 - \frac{4}{3}\pi r^3 = \pi r^2 h$

$\frac{3}{3}\pi r^3 = \pi r^2 h$

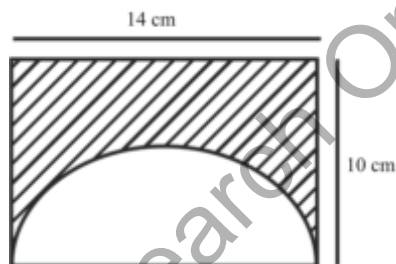
$\pi r^3 = \pi r^2 h$

$r = h$

$\frac{h}{r} = 1$

or $h : r = 1 : 1$

179. A semi circle is drawn on the side of the length of a rectangle. Find the area of the shaded part in the figure



- (a) 63 cm^2 (b) 129 cm^2
(c) 77 cm^2 (d) 14 cm^2

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (a) : Area of rectangle = Length \times Breadth
= 14×10
= 140 cm^2

Area of semicircle = $\frac{\pi r^2}{2}$
= $\frac{22}{7} \times \frac{1}{2} \times 7^2$
= 77 cm^2

Area of shaded portion = Area of rectangle - Area of semi-circle
= $140 - 77$
= 63 cm^2

180. The circumradius of a triangle is 9 cm while the inradius of it is 4 cm. What is the distance between the circumcentre and the incentre of the triangle?
- (a) 3 cm (b) 2 cm
(c) 4 cm (d) 5 cm

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (a) Circumradius of triangle (R) = 9 cm

Inradius of triangle (r) = 4 cm

Distance between circumradius and inradius of triangle

= $\sqrt{R^2 - 2rR}$

= $\sqrt{(9)^2 - 2 \times 4 \times 9} = \sqrt{81 - 72} = \sqrt{9}$

D = 3 cm

181. The circumference of a circle is equal to the perimeter of an equilateral triangle. If the radius of the circle is 21 cm, what is the length of the side of the equilateral triangle?
- (a) 44 cm (b) 22 cm
(c) 33 cm (d) 55 cm

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (a) : Perimeter of equilateral triangle = Circumference of a circle of radius 21 cm

So, perimeter of equilateral $\Delta = 2 \times \frac{22}{7} \times 21$

One side of equilateral $\Delta \times 3 = 6 \times 22$

Side = $\frac{6 \times 22}{3} = 44 \text{ cm}$

Hence, the side of the given equilateral triangle is = 44 cm

182. Find the volume of the largest sphere that can be out of a cube of side 21 cm.
- (a) 4851 cm^3 (b) 5841 cm^3
(c) 8551 cm^3 (d) 4158 cm^3

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,

Radius of sphere = $\frac{\text{Side of cube}}{2}$

$r = \frac{21}{2} \text{ cm}$

\therefore Volume of sphere = $\frac{4}{3}\pi r^3$

= $\frac{4}{3} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times \frac{21}{2}$

= $11 \times 21 \times 21$

= 11×441

= 4851 cm^3

183. The dimensions of a metallic cuboid are 50 cm × 40 cm × 32 cm. This cuboid is melted and recast into a cube. Find the surface area of the cube.

- (a) 8,350 cm² (b) 7,150 cm²
(c) 8,700 cm² (d) 9,600 cm²

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (d) : Volume of cuboid = $50 \times 40 \times 32$
= 64000 cm³

According to the question,

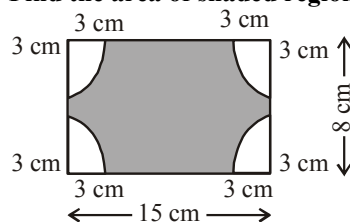
Volume of cube = Volume of cuboid

$$(\text{side})^3 = a^3 = 64000 \text{ cm}^3$$

$$a = 40 \text{ cm}$$

$$\begin{aligned} \therefore \text{Surface area of cube} &= 6a^2 \\ &= 6 \times (40)^2 \\ &= 6 \times 1600 \\ &= 9600 \text{ cm}^2 \end{aligned}$$

184. Find the area of shaded region



- (a) $\frac{588}{7} \text{ cm}^2$ (b) $\frac{642}{7} \text{ cm}^2$
(c) $\frac{78}{7} \text{ cm}^2$ (d) $\frac{12}{7} \text{ cm}^2$

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\text{Area of shaded portion} = \text{Area of rectangle} - \frac{1}{4} \times 4$$

Area of sectors

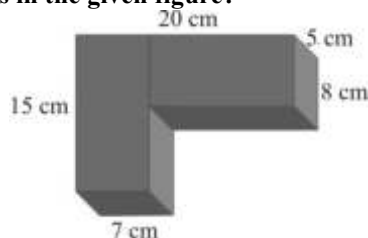
$$= 15 \times 8 - \pi r^2$$

$$= 120 - \frac{22}{7} \times 3 \times 3 \quad (\because r = 3 \text{ cm})$$

$$= \frac{840 - 198}{7}$$

$$= \frac{642}{7} \text{ cm}^2$$

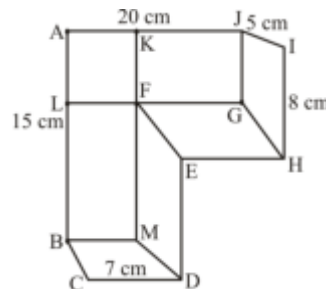
185. What is the total surface area of the visible faces in the given figure?



- (a) 580 cm² (b) 384 cm²
(c) 905 cm² (d) 1325 cm²

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (b)



$$\text{Area of ALGJ} = 20 \times 8 = 160$$

$$\text{Area of LBMF} = 7 \times 7 = 49$$

$$\text{Area of BCDM} = 7 \times 5 = 35$$

$$\text{Area of MDEF} = 7 \times 5 = 35$$

$$\text{Area of GHIJ} = 8 \times 5 = 40$$

$$\text{Area of EFGH} = 13 \times 5 = 65$$

$$\underline{\quad 384 \quad}$$

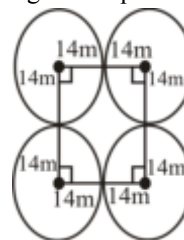
$$\text{Total area} = 384 \text{ cm}^2$$

186. Four cows are tethered to the four corners of a square field of length 28 m so that each cow can just touch the two cows in the adjacent corners. If the grass in the area inside the square field that was accessible to the cows was enough to feed them for 22 days, for how many days would the grass that is beyond the reach of these cows be able to feed them if someone cuts it and leaves it inside the grazable parts? [Use $\pi = 22/7$]

- (a) 7 (b) 6
(c) 5 (d) 4

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question –



Area of remaining part = Area of square field – Area of 4 sectors

$$= (28)^2 - 4 \times \pi \times (14)^2 \times \frac{90^\circ}{360^\circ}$$

$$= 784 - 4 \times \frac{22}{7} \times 14 \times 14 \times \frac{1}{4}$$

$$= 784 - 616$$

$$= 168 \text{ m}^2$$

Area of the part that is accessible to the cow is 616 m² which is enough to feed for 22 days.

$$22 = 616$$

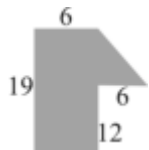
$$1 = 28$$

$$1 \times 6 = 28 \times 6$$

$$6 = 168$$

Hence, it is enough to feed for 6 days.

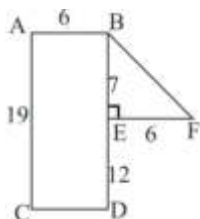
187. What is the area of the compound shape?



- (a) 114 units (b) 21 units
(c) 135 square units (d) 114 square units

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) :



From above diagram,

Area of the given figure = Area of rectangle ABCD + Area of triangle BEF

$$= 19 \times 6 + \frac{1}{2} \times 6 \times 7 = 114 + 21 = 135 \text{ square units}$$

188. 30 ml paint is required to paint a circular plate of 20 cm radius. How much paint is required to paint a similar plate of radius 80 cm?

- (a) 450 ml (b) 300 ml
(c) 480 ml (d) 360 ml

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

$$\begin{aligned} \text{Area of circular plate} &= \pi r^2 \\ &= \pi \times 20^2 \\ &= 400\pi \end{aligned}$$

The area of circular plate will be painted with full colours.

So, the paint applied to the area of $400\pi \text{ cm}^2 = 30\text{ml}$

$$\therefore \text{Paint required in } 1 \text{ cm}^2 \text{ area} = \frac{30\text{ml}}{400\pi}$$

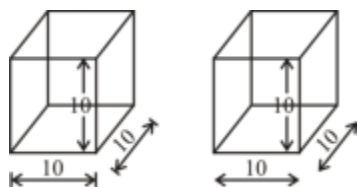
$$\therefore \text{Required paint} = 80 \times 80 \times \pi \times \frac{30\text{ml}}{400\pi} = 480\text{ml}$$

189. If two cubes, each with a side of 10 cm, are joined end to end, then find the surface area of the resulting cuboid.

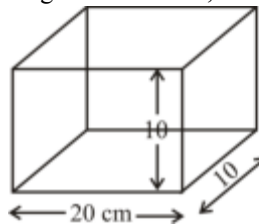
- (a) 300 cm² (b) 500 cm²
(c) 1000 cm² (d) 100 cm²

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) :



After joining the two cubes,



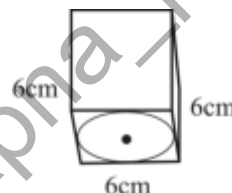
$$\begin{aligned} \text{Surface area of cuboid} &= 2(L \times W + W \times H + H \times L) \\ &= 2(20 \times 10 + 10 \times 10 + 10 \times 20) \\ &= 2(500) = 1000 \text{ cm}^2 \end{aligned}$$

190. The largest sphere is cut off from a solid cube of side 6 cm. The volume of the sphere will be:

- (a) 108π cm³ (b) 27π cm³
(c) 36π cm³ (d) 12π cm³

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (c) :



Diameter of sphere = 6 cm

$$2R = 6 \text{ cm}$$

Radius (R) = 3 cm

$$\text{Volume of sphere} = \frac{4}{3}\pi R^3$$

$$\begin{aligned} &= \frac{4}{3} \times \pi \times 3 \times 3 \times 3 \\ &= 36\pi \text{ cm}^3 \end{aligned}$$

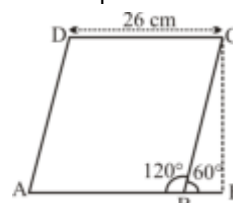
191. A rectangle with dimensions of 24 cm and 28 cm was reconstructed to make a rhombus with the same perimeter as that of the rectangle and 120° as one of its angles. The area of the rhombus was:

- (a) $\frac{169\sqrt{3}}{3} \text{ cm}^2$ (b) $169\sqrt{3} \text{ cm}^2$
(c) $338\sqrt{3} \text{ cm}^2$ (d) $\frac{338\sqrt{3}}{3} \text{ cm}^2$

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question,

$$\text{Side of Rhombus} = \frac{2(24 + 28)}{4} = 26 \text{ cm}$$



In triangle BCE,

$$\sin 60^\circ = \frac{CE}{BC}$$

$$\frac{\sqrt{3}}{2} = \frac{CE}{26}$$

$$CE = 13\sqrt{3} \text{ cm}$$

$$\text{Area of Rhombus} = b \times h = 26 \times 13\sqrt{3} = 338\sqrt{3} \text{ cm}^2$$

192. There is a regular hexagon of side 5 cm. Find its area.

- (a) $36\sqrt{3} \text{ cm}^2$ (b) $\frac{75\sqrt{3}}{2} \text{ cm}^2$
 (c) $25\sqrt{3} \text{ cm}^2$ (d) $\frac{50\sqrt{3}}{3} \text{ cm}^2$

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (b) : Area of regular hexagon (A) = $\frac{3\sqrt{3} \times a^2}{2}$

Given: Side (a) = 5cm

$$\text{Area} = \frac{3\sqrt{3} \times 5 \times 5}{2} = \frac{75\sqrt{3}}{2} \text{ cm}^2$$

193. How many time will it take for Ramesh to walk around a 50 meters square park if he runs at the rate of 18 km/h?

- (a) 40 sec (b) 20 sec
 (c) 80 sec (d) 160 sec

RRB NTPC 18.04.2016 Shift : 1

Ans : (a) Given-

Side of square shape park = 50 m

$$\text{Perimeter of square shape park} = 4 \times 50 = 200 \text{ m}$$

Speed of Ramesh = 18 Km/h

$$= 18 \times \frac{5}{18} \text{ meter/second} = 5 \text{ meter/second}$$

$$\text{Time taken by Ramesh to run around a park is} = \frac{200}{5} = 40 \text{ seconds}$$

194. The ratio of the area of an equilateral triangle of side x to the area of a square of side x is:

- (a) $\sqrt{3} : 4$ (b) $\sqrt{3} : 8$
 (c) $\sqrt{3} : 2$ (d) $\sqrt{3} : 1$

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (a) : Area of equilateral triangle : Area of square

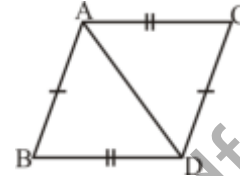
$$= \frac{\sqrt{3}}{4} x^2 : x^2 = \sqrt{3} : 4$$

195. If a triangle and a parallelogram are on the same base and between the same parallel lines, then the area of the triangle is equal to :

- (a) One- third of the area of the parallelogram
 (b) Half of the area of the parallelogram
 (c) Three-fourth of the area of the parallelogram
 (d) The area of the parallelogram

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b)



From figure,

$$\text{Area of } \triangle ABD = \frac{1}{2} \times \text{area of parallelogram ABCD}$$

Hence, it is clear from the above that a parallelogram and a triangle are created on same base and same parallel lines. Hence the area of triangle will be half of the area of the parallelogram.

196. When a square is made by bending a wire then the area of the square is 484 cm^2 . If the same wire is bent as a circle then its area will be:

- (a) 264 sq. cm. (b) 616 sq. cm.
 (c) 488 sq. cm. (d) 492 sq. cm.

RRB NTPC 02.04.2016 Shift : 3

Ans : (b) Area of square = 484 square cm.

$$(\text{Side})^2 = 484 = (22)^2$$

$$\text{Side} = 22 \text{ cm}$$

$$\text{Perimeter of square} = 4 \times \text{side} = 4 \times 22 = 88 \text{ cm}$$

$$\text{Perimeter of circle} = \text{Perimeter of square} = 88 \text{ cm}$$

$$\therefore 2\pi r = 88 \Rightarrow 2 \times \frac{22}{7} \times r = 88$$

$$\Rightarrow r = \frac{4 \times 7}{2} = 14 \text{ cm}$$

$$\text{Area of circle} = \pi r^2$$

$$= \frac{22}{7} \times (14)^2 = \frac{22}{7} \times 14 \times 14$$

$$= 22 \times 2 \times 14 = 616 \text{ cm}^2$$

197. A piece of wire is folded and shaped into a square with a side of 44cm. Again the square is shaped into a circle. What is the radius of this circle?

- (a) 108 cm. (b) 56 cm.
 (c) 14 cm. (d) 28 cm.

RRB NTPC 18.01.2017 Shift : 3

Ans : (d) From the question,

Side of square = 44 cm

Perimeter = 4 × side = 4 × 44 ⇒ 176 cm

Perimeter of square = Circumference of a circle = 176 cm

$$\therefore 2\pi r = 176 \text{ cm} \quad \left(\because \pi = \frac{22}{7} \right)$$

$$\text{Radius (r)} = \frac{176 \times 7}{22 \times 2} = 28 \text{ cm}$$

198. Find the perimeter (in cm) of a square having an area equal to the area of a rhombus of whose diagonals are 8 cm and 16 cm

- (a) 32 (b) 34
(c) 36 (d) 35

RRB NTPC (Stage-II) –12/06/2022 (Shift-II)

Ans. (a) : Area of rhombus = $\frac{1}{2} \times d_1 \times d_2$
(where d = diagonal)

$$= \frac{1}{2} \times 8 \times 16$$

$$= 64 \text{ cm}^2$$

According to the question,

Area of square = Area of rhombus

Side of square = $\sqrt{\text{Area of square}}$

$$= \sqrt{64}$$

$$= 8 \text{ cm}$$

$$\text{Perimeter of square} = \text{side of square} \times 4$$

$$= 8 \times 4$$

$$= 32 \text{ cm}$$

199. The perimeter of a square is equal to the perimeter of a rectangle of length 56 cm and breadth 42 cm. Find the perimeter of a semicircle (in cm) whose diameter is equal to the side of the square (Use $\pi = \frac{22}{7}$)

- (a) 182 (b) 224
(c) 198 (d) 126

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (d) : Perimeter of square = Perimeter of rectangle

$$4 \times \text{side} = 2(l+b)$$

$$4 \times \text{side} = 2(56+42)$$

$$4 \times \text{side} = 2 \times 98$$

$$4 \times \text{side} = 196$$

$$4 \times \text{side} = 196$$

$$\text{side} = 49$$

$$\text{radius of semicircle} = \frac{49}{2}$$

$$\text{Perimeter of semicircle} = \pi r + 2r$$

$$= \frac{22}{7} \times \frac{49}{2} + 49$$

$$= 77 + 49 = 126 \text{ cm}$$

200. The area of a square field is 7200 m². How long will a cycle take to cross the field diagonally at a constant rate of 4 km/h?

- (a) 25 minutes (b) 30 minutes
(c) 5 minutes (d) $\frac{9}{5}$ minutes

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let the length of one side of the square field

= a meter

$$a^2 = 7200$$

$$a = 60\sqrt{2} \text{ m}$$

Then,

$$\text{Diagonal of the square} = a\sqrt{2}$$

$$= 60\sqrt{2} \times \sqrt{2} = 120 \text{ m}$$

$$\text{or } \frac{120}{1000} \text{ km.}$$

$$\text{Time taken to walk diagonally} = \frac{120}{4}$$

$$= \frac{3}{100} \text{ hour}$$

$$\text{or } \frac{3}{100} \times 60 = \frac{9}{5} \text{ minutes.}$$

201. The area of a square field is 313600 m². How long will it take for a woman to cross the field diagonally at the rate of $4\sqrt{2}$ m/s.?

- (a) 3 minutes (b) 2 minutes 20 sec.
(c) 2 minutes 40 sec. (d) 3 minutes 10 sec.

RRB NTPC 28.04.2016 Shift : 3

Ans : (b) Given—

Area of square field = 313600 square meter

$$(\text{side})^2 = 313600$$

$$\text{Side} = \sqrt{313600} = 560 \text{ meter}$$

$$\therefore \text{Diagonal} = \text{side} \times \sqrt{2} = 560\sqrt{2} \text{ meter (distance)}$$

$$\text{Speed} = 4\sqrt{2} \text{ meter/second}$$

Hence time taken to cross the field diagonally = distance/speed

$$= \frac{560\sqrt{2}}{4\sqrt{2}} = 140 \text{ seconds} = 2 \text{ minutes } 20 \text{ seconds}$$

202. Ankita stands at the corner of a rectangular field of 40 m length and 30 m breadth. If Ankita runs only along the diagonal and returns to the starting point, then what is the total distance covered by Ankita?

(a) 100 m (b) 80 m
(c) 140 m (d) 120 m

RRB NTPC 28.03.2016 Shift : 3

Ans. (a) : Length of diagonal of rectangle

$$= \sqrt{(40)^2 + (30)^2}$$

$$= \sqrt{1600 + 900} = \sqrt{2500} = 50 \text{ m}$$

∴ Total distance covered by Ankita

$$= 2 \times 50 = 100 \text{ m}$$

203. If the volume of a cube is equal to the volume of a cuboid of dimensions 54 cm, 18 cm and 6 cm, then find the length of the side of the cube?

(a) 18 cm (b) 24 cm
(c) 12 cm (d) 16 cm

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (a) : Volume of Cuboid = $\ell \times b \times h$

$$= 54 \times 18 \times 6 \text{ cm}^3$$

∴ Volume of Cube = Volume of Cuboid

$$(\text{side})^3 = 18 \times 18 \times 18 \times 6$$

$$= 18 \times 18 \times 18$$

Hence the length of the side of the cube = 18 cm

204. A solid metallic cylinder of base radius 3 cm and height 5 cm is melted to form cones each of height 1 cm and base radius 1 mm. How many cones were formed?

(a) 13,500 cones (b) 12,500 cones
(c) 19,500 cones (d) 10,500 cones

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) : Let,

Number of formed cones = n

According to the question-

Volume of cylinder = n × Volume of cone

$$\pi r^2 h = n \times \frac{1}{3} \pi r^2 h$$

$$\pi \times (3)^2 \times 5 = n \times \frac{1}{3} \pi \times \left(\frac{1}{10}\right)^2 \times 1$$

$$n = 9 \times 5 \times 3 \times 100$$

$$n = 13500 \text{ cones}$$

205. A solid metallic sphere of radius 3 cm is melted and drawn into a wire of thickness 4 mm What is the length of the wire (in m)?

(a) 7.5 (b) 8
(c) 9 (d) 9.25

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (c) : Volume of wire = Volume of sphere

$$4 \text{ mm} = \frac{4}{10} \text{ cm.}$$

$$\text{Radius of wire} = \frac{1}{2} \times \frac{4}{10} = 0.2 \text{ cm.}$$

$$\text{Volume of wire} = \pi r^2 l$$

Where, l = length of wire

$$\therefore \pi (0.2)^2 l = \frac{4}{3} \pi (3)^3$$

$$0.04 \times l = \frac{4}{3} \times 27$$

$$0.04 \times l = 36$$

$$l = \frac{36}{0.04}$$

$$l = \frac{36 \times 100}{4}$$

$$l = 9 \times 100 \text{ cm}$$

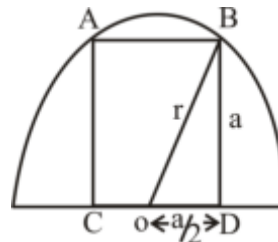
$$l = 9 \text{ m.}$$

206. What is the area of the largest square that is inscribed in a semicircle of radius 10 cm?

(a) 10 cm² (b) 70 cm²
(c) 80 cm² (d) 90 cm²

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let- each side of the square be 'a' cm.



In $\triangle ODB$

$$r^2 = a^2 + \frac{a^2}{4}$$

$$r^2 = \frac{5a^2}{4}$$

$$a^2 = \frac{4r^2}{5} = \frac{4 \times (10)^2}{5} = 80 \text{ cm}^2$$

Hence, the area of the largest square (a) = 80 cm²

Type - 1

Problems Based on Arithmetic and Geometric Progression

1. What is the sum of the first 25 odd numbers?

- (a) 150 (b) 625
(c) 250 (d) 144

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (b) : The first 25 odd numbers will be 1, 3, 5, 7, 9, 49 respectively which are in the arithmetic progression.

Where first term (a) = 1

and common difference (d) = 3 - 1 = 2

And number of terms (n) = 25

So, sum of n numbers of term in arithmetic progression

$$\begin{aligned} S_n &= \frac{n}{2}[2a + (n-1)d] \\ &= \frac{25}{2}[2 \times 1 + (25-1) \times 2] \\ &= \frac{25}{2}[2 + (24) \times 2] \\ &= \frac{25}{2}[2 + 48] \\ &= \frac{25 \times 50}{2} \\ &= 25 \times 25 = 625 \end{aligned}$$

Hence, sum of the first 25 odd number = 625

2. How many numbers are there between 1000 and 3000 that are completely divisible by 7 ?

- (a) 281 (b) 284
(c) 286 (d) 283

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c) :

Numbers divisible by 7 between 1000 and 3000

1001, 1008 2996.

$$\therefore l = a + (n-1)d$$

Where, l = Last term

a = First term

d = Common difference

n = Number of terms

$$\therefore 2996 = 1001 + (n-1) \times d$$

$$1995 = (n-1) \times 7$$

$$(n-1) = 285$$

$$n = 286$$

3. $\left(1 - \frac{1}{n}\right) + \left(1 - \frac{2}{n}\right) + \left(1 - \frac{3}{n}\right) + \dots$ up to n terms will result as:

- (a) $\frac{1}{2n}$ (b) $\frac{1}{2n-1}$
(c) $\frac{1}{n^2}$ (d) $\frac{n-1}{2}$

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (d) : $\left(1 - \frac{1}{n}\right) + \left(1 - \frac{2}{n}\right) + \left(1 - \frac{3}{n}\right) + \dots$ up to n terms

$$= (1+1+1 \dots n \text{ term}) - \left(\frac{1}{n} + \frac{2}{n} + \frac{3}{n} + \dots + \frac{n}{n}\right)$$

$$= n - \left(\frac{1}{n} + \frac{2}{n} + \frac{3}{n} + \dots + \frac{n}{n}\right)$$

Where $\left(\frac{1}{n} + \frac{2}{n} + \frac{3}{n} + \dots + \frac{n}{n}\right)$ is A.P.

$$\text{So, difference} = \frac{2}{n} - \frac{1}{n} = \frac{1}{n}$$

We know that,

$$\text{Sum of n terms in A.P. } (S_n) = \frac{n}{2}[2a + (n-1)d]$$

$$= n - \left[\frac{n}{2} \left\{ 2 \times \left(\frac{1}{n}\right) + (n-1) \left(\frac{1}{n}\right) \right\} \right]$$

$$= n - \left[\frac{n}{2} \left\{ \left(\frac{2}{n}\right) + \left(\frac{n-1}{n}\right) \right\} \right]$$

$$= n - \left\{ 1 + \frac{n}{2} \left(\frac{n-1}{n}\right) \right\}$$

$$= n - \frac{n+1}{2}$$

$$= \frac{n-1}{2}$$

4. Find the number of terms in the sequence 4, 8, 16, 32, 512

- (a) 10 (b) 8
(c) 9 (d) 7

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (b) : 4, 8, 16, 32,, 512

$$l = ar^{n-1}$$

Where, l = Last term

a = First term

n = Number of terms

r = Common ratio

$$\therefore 512 = 4 \times (2)^{n-1}$$

$$128 = 2^{n-1}$$

$$2^7 = 2^{n-1}$$

$$n-1 = 7$$

$$n = 8$$

5. What is the value of k in the following Arithmetic progression?

$$15+13+11+9+\dots+k=-105$$

- (a) 7 (b) -21
(c) -5 (d) -25

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (d) : $15 + 13 + 11 + 9 + \dots + k = -105$

We know that sum of n terms

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

n = No. of terms, a = First number,

d = Common difference

$$-105 = \frac{n}{2} [2 \times 15 + (n-1) \times -2]$$

$$-210 = n[30 - 2n + 2]$$

$$32n - 2n^2 = -210$$

$$2n^2 - 32n - 210 = 0$$

$$n^2 - 16n - 105 = 0$$

$$n^2 - 21n + 5n - 105 = 0$$

$$n(n-21) + 5(n-21) = 0$$

$$(n+5)(n-21) = 0$$

$$n = -5, n = 21$$

$$\therefore a_n = a_1 + (n-1)d$$

On putting, $n = 21$

$$k = 15 + (21-1) \times -2$$

$$k = 15 - 40$$

$$k = -25$$

6. The sum of all odd numbers between 0 and 52 is:

- (a) 729 (b) 576
(c) 676 (d) 625

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (c) : Total odd numbers between 0 and 52

= 1, 3, 5, 7, 9, 11,, 51

\therefore No. of terms (n) = 26

First term (a) = 1

Last term (ℓ) = 51

$$\therefore \text{Sum of } n \text{ terms} = \frac{n}{2} (a + \ell)$$

$$\therefore = \frac{26}{2} (51 + 1)$$

$$= 13 \times 52 = 676$$

7. What is the 50th term of arithmetic progression 3, 8, 13, 18, 23,

- (a) 150 (b) 248
(c) 267 (d) 345

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (b) : 3, 8, 13, 18, 23, 50th term

$$a = 3 \quad d = 8 - 3 = 5 \quad n = 50$$

Formula : $T_n = a + (n-1)d$

$$= 3 + (50-1) \times 5$$

$$= 3 + 245$$

$$= 248$$

8. Find the ninth term of an arithmetic progression whose first term is 5 and the common difference is 4.

- (a) 41 (b) 37
(c) 35 (d) 39

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (b) : Given that-

$$n = 9$$

$$\text{First term } (a) = 5$$

$$\text{Difference } (d) = 4$$

$$T_n = a + (n-1)d$$

$$T_9 = 5 + (9-1) \times 4$$

$$T_9 = 5 + 8 \times 4$$

$$T_9 = 37$$

9. If the first term of a geometric progression is 2 and the common ratio is 3, then what will be the fifth term of the geometric progression?

- (a) 243 (b) 324
(c) 81 (d) 162

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : $a = 2, r = 3$

$$T_n = ar^{n-1}$$

$$T_5 = 2 \times 3^{5-1}$$

$$T_5 = 2 \times 3^4$$

$$= 162$$

10. Find the sum of the all even natural number less than 85.

- (a) 4700 (b) 840
(c) 1806 (d) 1408

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : Even natural numbers smaller than 85 are.

2, 4, 6, 8, 10, 80, 82, 84

$$n = \frac{l-a}{d} + 1$$

(Where l - Last term, a - First term,
 d - Common difference)

$$= \frac{84-2}{2} + 1$$

$$\boxed{n = 42}$$

Sum of even natural number = $n(n+1)$

$$= 42(42+1)$$

$$= 1806$$

11. The 10th term, of the Arithmetic Progression 2, 7, 12, is:

- (a) 27 (b) 37
(c) 47 (d) 57

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given that,

Arithmetic progression 2, 7, 12 n

First term (a) = 2

Number of terms (n) = 10

Common difference (d) = $T_2 - T_1 = 7 - 2 = 5$

By the formula we know,

$$T_n = a + (n-1)d$$

$$T_{10} = 2 + (10-1)5$$

$$= 2 + 45$$

$$= 47$$

12. If the ratio of the 11th term of an AP to its 18th term is 2 : 3. Find the ratio of the sum of its first five terms to the sum of its first 10 terms.

- (a) 1 : 2 (b) 5 : 4
(c) 6 : 17 (d) 17 : 6

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the first term of A.P. is a and common difference is d .

$$n^{\text{th}} \text{ term } (a_n) = a + (n - 1) \cdot d$$

$$\frac{a_{11}}{a_{18}} = \frac{a + 10d}{a + 17d} = \frac{2}{3}$$

$$3a + 30d = 2a + 34d$$

$$a = 4d$$

$$\therefore S_n = \frac{n}{2} [2a + (n - 1) \cdot d]$$

$$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}[2a + 4d]}{\frac{10}{2}[2a + 9d]}$$

$$= \frac{8d + 4d}{2[8d + 9d]} \quad [\because a = 4d]$$

$$= \frac{6d}{17d} = 6 : 17$$

13. How many terms in the series 7, 14, 21, 28, the sum of is 952?

- (a) 16 (b) 17
(c) 18 (d) 19

RRB NTPC 28.04.2016 Shift : 1

Ans : (a) The given series- 7, 14, 21, 28,

Let the sum of n terms = 952

$$7 + 14 + 21 + 28 + \dots = 952$$

$$\Rightarrow 7(1 + 2 + 3 + 4 + \dots) = 952$$

$$\Rightarrow 1 + 2 + 3 + 4 + \dots = 136$$

$$\Rightarrow \frac{n(n+1)}{2} = 136$$

$$\therefore \text{The sum of } n \text{ consecutive numbers} = \frac{n(n+1)}{2}$$

$$\Rightarrow n^2 + n = 272$$

$$\Rightarrow n^2 + n - 272 = 0$$

$$\Rightarrow n^2 + 17n - 16n - 272 = 0$$

$$\Rightarrow (n - 16)(n + 17) = 0$$

$$n - 16 = 0 \Rightarrow n = 16$$

Hence, the sum of 16 terms is 952.

14. Find the value of $6 + 11 + 16 + 21 + \dots + 71$

- (a) 539 (b) 561
(c) 661 (d) 639

RRB NTPC 19.04.2016 Shift : 2

Ans : (a) Given series-

$$6 + 11 + 16 + 21 + \dots + 71$$

\therefore This is an arithmetic progression in which-

$$a = 6, d = 5, l = 71$$

$$\therefore l = a + (n - 1) d$$

$$\Rightarrow 71 = 6 + (n - 1) 5$$

$$\Rightarrow (n - 1) = 13$$

$$\Rightarrow n = 14$$

Hence, the required sum of the series $S_n = \frac{n}{2}(a + l)$

$$= \frac{14}{2}(6 + 71) = 7 \times 77 = \boxed{539}$$

15. If 11, 17, 23..... be in an arithmetical progression. Find its 12th term.

- (a) 77 (b) 83
(c) 71 (d) 89

RRB NTPC 29.04.2016 Shift : 3

Ans. (a) : 11, 17, 23,

$$a = 11$$

$$d = 17 - 11 = 6$$

$$\therefore T_n = a + (n - 1) \cdot d$$

$$T_{12} = 11 + (12 - 1) 6$$

$$= 11 + 11 \times 6 = 77$$

Type - 2

Problems Based on Linear Equations

1716. Determine the values of a and b for which the following system of equations has infinite solutions.

$$2x - (a - 4)y = 2b + 1, 4x - (a - 1)y = 5b - 1$$

- (a) $a = 7$ and $b = 1$ (b) $a = 7$ and $b = 3$
(c) $a = 5$ and $b = 2$ (d) $a = 2$ and $b = 7$

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (b) :

$$2x - (a - 4)y = 2b + 1, 4x - (a - 1)y = 5b - 1$$

$$2x - (a - 4)y - (2b + 1) = 0$$

On comparing $a_1x + b_1y + c_1 = 0$

$$a_1 = 2, b_1 = -(a - 4), c_1 = -(2b + 1)$$

$$4x - (a - 1)y - (5b - 1) = 0$$

On comparing $a_2x + b_2y + c_2 = 0$

$$a_2 = 4, b_2 = -(a - 1), c_2 = -(5b - 1)$$

If the equation has infinite solution then

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{1}{2} = \frac{a - 4}{a - 1}$$

$$a = 7$$

$$\frac{1}{2} = \frac{2b + 1}{5b - 1}$$

$$b = 3$$

$$a = 7 \text{ and } b = 3$$

17. For what value of K such that the equations $2x+3y+11 = 0$ and $6x+ky+33 = 0$ represent coincident lines.

- (a) 6 (b) 9
(c) 12 (d) 5

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (b) : $2x + 3y + 11 = 0$ (i)

$6x + ky + 33 = 0$ (ii)

On multiplying by 3 in equation (i)-

$6x + 9y + 33 = 0$ (iii)

From equation (iii) - equation (ii),

$9y - ky = 0$

$ky = 9y$

$k = 9$

18. What is the number of all positive solutions of the equation $|x \times 1| = 0$?

- (a) 1 (b) 0
(c) 2 (d) 3

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) : $|x \times 1| = 0$

$x \times 1 = 0$ (positive solutions)

$x = 0$

Type - 3 Problems Based on Algebraic Expressions and Formulas

19. If $x^4 - 6x^2 - 1 = 0$, then what is the value of $(x^6 - x^{-6}) - 3(x^4 + x^{-4})$?

- (a) 178 (b) 148
(c) 120 (d) 156

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (c) : $x^4 - 6x^2 - 1 = 0$

On dividing by x^2 both sides we get

$$x^2 - 6 - \frac{1}{x^2} = 0$$

$$x^2 - \frac{1}{x^2} = 6 \quad \dots (1)$$

On cubing both sides of equation,

$$x^6 - \frac{1}{x^6} - 3x^2 \times \frac{1}{x^2} \left(x^2 - \frac{1}{x^2} \right) = 216$$

$$x^6 - \frac{1}{x^6} = 216 + 18$$

$$= 234 \quad \dots (2)$$

On squaring equation (1)

$$x^4 + \frac{1}{x^4} - 2x^2 \times \frac{1}{x^2} = 36$$

$$x^4 + \frac{1}{x^4} = 36 + 2$$

$$= 38 \quad \dots (3)$$

According to the question,

$$(x^6 - x^{-6}) - 3(x^4 + x^{-4})$$

$$= \left(x^6 - \frac{1}{x^6} \right) - 3 \left(x^4 + \frac{1}{x^4} \right)$$

On putting the value of equation (2) and (3)-

$$= 234 - 3 \times 38$$

$$= 234 - 114$$

$$= 120$$

20. If $x(x + y + z) = 30$, $y(x + y + z) = 64$, $z(x + y + z) = 50$ then find the value of $2(x + y + z)$ Where $x, y, z > 0$.

- (a) 22 (b) 26
(c) 24 (d) 20

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : Given,

$x(x + y + z) = 30$ and $x, y, z > 0$

$y(x + y + z) = 64$

$z(x + y + z) = 50$

$(x + y + z)[x + y + z] = 30 + 64 + 50$

$(x + y + z)^2 = (12)^2$

$(x + y + z) = 12$

Then,

$2(x + y + z)$

$= 2 \times 12$

$= 24$

21. If $(y + z) = 8$ and $yz = 6$ find the value $(y - z)^2$

- (a) 49 (b) 36
(c) 40 (d) 44

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : Given,

$(y + z) = 8$

$yz = 6$

$(y - z)^2 = ?$

$(y + z)^2 = y^2 + z^2 + 2yz$

$(8)^2 = y^2 + z^2 + 2 \times 6$

$y^2 + z^2 = 64 - 12$

$y^2 + z^2 = 52 \quad \dots (i)$

Now again,

$(y - z)^2 = y^2 + z^2 - 2yz$

$= 52 - 12$

$(y - z)^2 = 40$

22. Find the value of x in $5x + 7y = 19$, $7x + 5y = 17$

- (a) 1 (b) 2
(c) 3 (d) 4

RRB NTPC 03.04.2016 Shift : 3

Ans : (a) $5x + 7y = 19$ (i)

$7x + 5y = 17$ (ii)

After subtracting equation (i) $\times 5$ and equation (ii) $\times 7$,

$25x + 35y = 95$

$49x + 35y = 119$

$\underline{\hspace{1cm}}$

$-24x = -24$

$x = \frac{24}{24} = 1$

23. If $x + 2y = 27$ and $x - 2y = -1$ then find the value of y .

- (a) 3 (b) 4
(c) 7 (d) 6

RRB NTPC 31.03.2016 Shift : 2

Ans : (c) $x + 2y = 27$ (1)

$x - 2y = -1$ (2)

∴ Equation (1) - equation (2)

$x + 2y = 27$

$x - 2y = -1$

$\frac{-}{+} \frac{+}{-}$

$4y = 28$

$y = 7$

24. Solve : $(x + 2y)(2x - y)$

- (a) $2x^2 + 5xy + 2y^2$ (b) $2x^2 + 3xy - 2y^2$
(c) $x^2 + 4xy + y^2$ (d) $x^2 + 4xy - y^2$

RRB NTPC 29.03.2016 Shift : 3

Ans : (b) $(x + 2y)(2x - y)$

$= 2x^2 - xy + 4xy - 2y^2$

$= 2x^2 + 3xy - 2y^2$

25. If $(2a/m + b/n) = 2$ and $(a/m - b/n) = 4$ then find the value of 'a' and 'b' respectively.

- (a) $2m, -2n$ (b) $-2n, 2m$
(c) $2m, 2n$ (d) $-2m, 2n$

RRB NTPC 18.01.2017 Shift : 1

Ans : (a) $\frac{2a}{m} + \frac{b}{n} = 2$(i)

$\frac{a}{m} - \frac{b}{n} = 4$(ii)

Adding equation (i) and (ii)

$\frac{2a}{m} + \frac{a}{m} = 6$

$\frac{3a}{m} = 6$

$a = 2m$

Again multiplying by 2 in equation (ii) and subtracting equation (i)

$\frac{2a}{m} - \frac{2b}{n} = 8$

$\frac{2a}{m} + \frac{b}{n} = 2$

$\frac{-3b}{n} = 6$

$b = -2n$

26. Expand : $(c-3)^3$

- (a) $c^3 + 9c^2 + 27c + 27$ (b) $c^3 - 9c^2 + 27c - 9$
(c) $c^3 - 9c^2 + 27c - 27$ (d) $c^3 - 9c^2 - 27c - 27$

RRB NTPC 30.03.2016 Shift : 2

Ans : (c) $(c-3)^3 = c^3 - 27 - 9c^2 + 27c$
 $= c^3 - 9c^2 + 27c - 27$

[∵ $(a-b)^3 = a^3 - b^3 - 3a^2b + 3ab^2$]

27. Expand : $(s + 2)^3$

- (a) $s^3 + 3s^2 + 12s + 8$ (b) $s^3 + 3s^2 + 6s + 8$
(c) $s^3 + 6s^2 + 12s + 8$ (d) $s^3 + 6s^2 + 6s + 8$

RRB NTPC 29.03.2016 Shift : 3

Ans : (c) $(s + 2)^3 = s^3 + (2)^3 + 3 \times s \times 2(s + 2)$

$= s^3 + 8 + 6s^2 + 12s$

$= s^3 + 6s^2 + 12s + 8$

28. If $x^2 + 25y^2 = 10xy$, then $x : y = ?$

- (a) 5 : 1 (b) 2 : 3
(c) 1 : 5 (d) 3 : 5

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (a) : Given,

If $x^2 + 25y^2 = 10xy$ then,

$= x^2 + (5y)^2 - 2 \times x \times 5y = 0$ $((a-b)^2 = a^2 + b^2 - 2ab)$

$(x - 5y)^2 = 0$

$x - 5y = 0$

$x = 5y$

$\frac{x}{y} = \frac{5}{1}$

Hence, $x : y = 5 : 1$

29. If $x = 12$ and $y = 7$, then the value of

$\left(\frac{x^2 + y^2 - xy}{x^3 + y^3} \right)$ is-

- (a) $\frac{1}{5}$ (b) $\frac{2}{19}$
(c) $\frac{1}{2}$ (d) $\frac{1}{19}$

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : $x = 12$, $y = 7$

$\frac{x^2 + y^2 - xy}{x^3 + y^3} = \frac{(12)^2 + (7)^2 - 12 \times 7}{(12)^3 + (7)^3}$

$= \frac{144 + 49 - 12 \times 7}{1728 + 343}$

$= \frac{193 - 84}{2071} = \frac{109}{2071} = \frac{1}{19}$

30. Find the value of $a^2 + b^2 + c^2 - 2ab + 2ac - 2bc$, if $a = x + y$, $b = x - y$ and $c = 2x - 1$

- (a) $(x - y - 1)^2$ (b) 0
(c) $(2x + 2y - 1)^2$ (d) $(2x - 2y - 1)^2$

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$a^2 + b^2 + c^2 - 2ab + 2ac - 2bc = (a - b + c)^2$

From question,

$(x + y - x + y + 2x - 1)^2$

(On putting the value of a, b and c)

$(2x + 2y - 1)^2$

31. If $x^4 + x^{-4} = 1154$, then the value of $x + x^{-1}$ is:

- (a) 12 (b) 6
(c) 8 (d) 5

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (b) : $x^4 + x^{-4} = 1154$

or $x^4 + \frac{1}{x^4} = 1154$

On adding 2 both sides,

$$\left(x^2\right)^2 + \frac{1}{\left(x^2\right)^2} + 2 = 1156$$

$$\left(x^2 + \frac{1}{x^2}\right)^2 = 1156$$

$$x^2 + \frac{1}{x^2} = 34$$

On adding 2 both sides,

$$x^2 + \frac{1}{x^2} + 2 = 36$$

$$\left(x + \frac{1}{x}\right)^2 = 36$$

$$x + \frac{1}{x} = 6$$

or $x + x^{-1} = 6$

32. Find the value of

$$\frac{(3.17+9.12)^2 + (3.17-9.12)^2}{3.17 \times 3.17 + 9.12 \times 9.12}$$

- (a) 4 (b) 3
(c) 2 (d) 1

RRB NTPC 29.01.2021 (Shift-II) Stage I

Ans. (c) :

$$\begin{aligned} & \frac{(3.17+9.12)^2 + (3.17-9.12)^2}{3.17 \times 3.17 + 9.12 \times 9.12} \\ \therefore & \frac{(a+b)^2 + (a-b)^2}{a^2 + b^2} = \frac{2(a^2 + b^2)}{(a^2 + b^2)} = 2 \\ & = \frac{2[(3.17)^2 + (9.12)^2]}{[(3.17)^2 + (9.12)^2]} \\ & = 2 \end{aligned}$$

33. If $2x(x+y+z) = 250$, $2y(x+y+z) = 100$, $2z(x+y+z) = 100$ then find the value of $(3x+6y+15z)$.

- (a) 110 (b) 95
(c) 85 (d) 69

RRB NTPC 19.04.2016 Shift : 1

Ans : (b) $2x(x+y+z) = 250$ (1)

$$2y(x+y+z) = 100 \text{ (2)}$$

$$2z(x+y+z) = 100 \text{ (3)}$$

Adding the equation of (1), (2) and (3)

$$(x+y+z)(2x+2y+2z) = 450$$

$$2(x+y+z)^2 = 450$$

$$(x+y+z)^2 = 225$$

$$x+y+z = 15$$

\therefore From equation (1), $x = \frac{250}{30} = \frac{25}{3}$

From equation (2), $y = \frac{100}{30} = \frac{10}{3}$

From equation (3), $z = \frac{100}{30} = \frac{10}{3}$

$$\therefore 3x + 6y + 15z$$

$$= 3 \times \frac{25}{3} + 6 \times \frac{10}{3} + 15 \times \frac{10}{3} = 25 + 20 + 50 = 95$$

34. If $a = 5$, $b = 4$, $c = 8$ then find the value of $(a^3 + b^3 + c^3 - 3abc) / (ab + bc + ca - a^2 - b^2 - c^2)$.

- (a) 15 (b) 17
(c) -17 (d) -15

RRB NTPC 19.04.2016 Shift : 2

Ans : (c) Given-

$$a = 5, b = 4, c = 8$$

$$\begin{aligned} & \frac{a^3 + b^3 + c^3 - 3abc}{(ab + bc + ca - a^2 - b^2 - c^2)} = \frac{(a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)}{(ab + bc + ca - a^2 - b^2 - c^2)} \\ & = - (a+b+c) = - (5 + 4 + 8) = -17 \end{aligned}$$

35. If $\left(x^2 + \frac{1}{16x^2}\right) = \frac{19}{2}$ then find the value of

$$\left(2x - \frac{1}{2x}\right)$$

- (a) 6 (b) 12
(c) 32 (d) 41

RRB NTPC 19.04.2016 Shift : 3

Ans : (a) $x^2 + \frac{1}{16x^2} = \frac{19}{2}$

$$\Rightarrow 4x^2 + \frac{1}{4x^2} = \frac{19}{2} \times 4 \text{ (Multiply by 4 in both side)}$$

$$\Rightarrow (2x)^2 + \frac{1}{(2x)^2} = 38 \text{(i)}$$

$$\begin{aligned} \therefore \left(2x - \frac{1}{2x}\right)^2 &= (2x)^2 + \frac{1}{(2x)^2} - 2 \\ &= 38 - 2 = 36 \end{aligned}$$

$$\Rightarrow 2x - \frac{1}{2x} = \sqrt{36} = 6 \text{ 90. If } a^3 + b^3 + c^3 - 3abc = 0$$

then find the value of $(a^2/bc + b^2/ac - 3)$.

- (a) $-c^2/ab$ (b) $-c^2/bc$
(c) $-c^3/ba$ (d) $-c/a$

RRB NTPC 19.04.2016 Shift : 2

Ans : (a) Given-

$$a^3 + b^3 + c^3 - 3abc = 0 \text{(i)}$$

$$\therefore \frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab} - 3 = 0 \text{ (Divided by abc in both side)}$$

$$\frac{a^2}{bc} + \frac{b^2}{ca} - 3 = -\frac{c^2}{ab}$$

$$= \boxed{-\frac{c^2}{ab}}$$

36. For real a, b and c if $a^2 + b^2 + c^2 = ab + bc + ca$, then find the value of $(a + b + c)^2$.
- (a) $9a^2$ (b) $81a^2$
(c) $27a^2$ (d) $243a^2$

RRB NTPC 18.04.2016 Shift : 1

Ans : (a) Given—

$$a^2 + b^2 + c^2 = ab + bc + ca$$

Similarly $a^2 = ab$

$$b^2 = bc$$

$$c^2 = ca$$

So $a = b = c$ -----(1)

So from the question,

$$\therefore (a + b + c)^2 = (a + a + a)^2 = 9a^2$$

37. If $a^2 + b^2 + c^2 + 3 = 2(a + b + c)$ then the value of $(a + b + c)$.

- (a) 2 (b) 5
(c) 4 (d) 3

RRB NTPC 12.04.2016 Shift : 1

Ans : (d) From the question,

$$a^2 + b^2 + c^2 + 3 = 2(a + b + c)$$

$$\Rightarrow a^2 + b^2 + c^2 + 3 - 2(a + b + c) = 0$$

$$\Rightarrow (a^2 - 2a + 1) + (b^2 - 2b + 1) + (c^2 - 2c + 1) = 0$$

$$\Rightarrow (a-1)^2 + (b-1)^2 + (c-1)^2 = 0$$

$$\Rightarrow \therefore a-1=0 \quad b-1=0 \quad c-1=0$$

$$a=1 \quad b=1 \quad c=1$$

$$\therefore a + b + c = 1 + 1 + 1 = 3$$

38. If $x^2 - 4x + 1 = 0$, what is the value of $x^2 + \frac{1}{x^2}$?

- (a) 14 (b) 15
(c) 18 (d) 16

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (a) : $x^2 - 4x + 1 = 0$

$$x - 4 + \frac{1}{x} = 0 \text{ [On dividing by } x \text{ in both sides]}$$

$$x + \frac{1}{x} = 4 \quad (\text{On squaring on both sides})$$

$$x^2 + \frac{1}{x^2} = 4^2 - 2$$

$$x^2 + \frac{1}{x^2} = 14$$

39. If $a + b = 10$ and $a^2 + b^2 = 68$, find $a^3 + b^3$.

- (a) 620 (b) 560
(c) 520 (d) 540

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (c) : Given,

$$a + b = 10$$

$$a^2 + b^2 = 68$$

Formula-

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$10^2 = 68 + 2ab$$

$$2ab = 100 - 68$$

$$ab = 16$$

Formula-

$$a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$$

$$a^3 + b^3 = 10(68 - 16)$$

$$a^3 + b^3 = 10 \times 52$$

$$a^3 + b^3 = 520$$

40. If $x^4 + \frac{1}{x^4} = 194$, find $x^3 + \frac{1}{x^3}$

- (a) 54 (b) 56
(c) 52 (d) 62

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (c) : Given,

$$x^4 + \frac{1}{x^4} = 194, \quad x^3 + \frac{1}{x^3} = ?$$

Let,

$$x^4 + \frac{1}{x^4} = k_1$$

$$\therefore x^2 + \frac{1}{x^2} = \sqrt{k_1 + 2}$$

$$x^2 + \frac{1}{x^2} = \sqrt{194 + 2}$$

$$x^2 + \frac{1}{x^2} = 14 = k_2$$

Again-

$$x + \frac{1}{x} = \sqrt{k_2 + 2}$$

$$x + \frac{1}{x} = \sqrt{14 + 2}$$

$$x + \frac{1}{x} = 4 \quad \dots\dots (I)$$

$$\therefore \left(x + \frac{1}{x}\right)^3 = x^3 + \frac{1}{x^3} + 3x \times \frac{1}{x} \left(x + \frac{1}{x}\right)$$

From equation (I)–

$$4^3 = x^3 + \frac{1}{x^3} + 3 \times 4$$

$$x^3 + \frac{1}{x^3} = 64 - 12$$

$$x^3 + \frac{1}{x^3} = 52$$

41. If $x + y + z = 0$, then what will be the value of

$$\frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy} ?$$

- (a) 3 (b) $\frac{x^2 y^2 z^2}{x}$
(c) $\frac{3x^2 + 3y^2 + 3z^2}{x}$ (d) $x^2 + y^2 + z^2$

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (a) : Given: $x + y + z = 0$

$$\begin{aligned} \therefore \frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy} &= \frac{x^3 + y^3 + z^3}{xyz} \\ &= \frac{3xyz}{xyz} \quad [\text{When } a+b+c=0 \text{ then } a^3+b^3+c^3=3abc] \\ &= 3 \end{aligned}$$

42. If $x = 2 - \sqrt{3}$, then $x - \frac{1}{x}$ is

- (a) $3\sqrt{3}$ (b) $-2\sqrt{3}$
(c) $5\sqrt{3}$ (d) $12 - 30\sqrt{3}$

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given,

$$\begin{aligned} x &= 2 - \sqrt{3} \\ \frac{1}{x} &= \frac{1}{2 - \sqrt{3}} \times \frac{2 + \sqrt{3}}{2 + \sqrt{3}} = \frac{2 + \sqrt{3}}{(2)^2 - (\sqrt{3})^2} = 2 + \sqrt{3} \\ x - \frac{1}{x} &= 2 - \sqrt{3} - (2 + \sqrt{3}) \\ &= 2 - \sqrt{3} - 2 - \sqrt{3} \\ &= -2\sqrt{3} \end{aligned}$$

43. The value of x that satisfying the equation $x^2 + a^2 = (b-x)^2$ is ?

- (a) $\frac{b^2 + a^2}{2b}$ (b) $\frac{a^2 - b^2}{2b}$
(c) $\frac{b^2 - a^2}{2a}$ (d) $\frac{b^2 - a^2}{2b}$

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : $x^2 + a^2 = (b-x)^2$

$$\begin{aligned} x^2 + a^2 &= b^2 + x^2 - 2bx \\ a^2 - b^2 &= -2bx \\ b^2 - a^2 &= 2bx \\ \frac{b^2 - a^2}{2b} &= x \end{aligned}$$

44. If $a+b+c = 17$, $abc = 168$, and $ab+bc+ca = 94$, then $a^3+b^3+c^3 = ?$

- (a) 621 (b) 623
(c) 620 (d) 622

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (b)

From formula- $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$

$$(17)^2 = a^2 + b^2 + c^2 + 2 \times 94$$

$$289 = a^2 + b^2 + c^2 + 188$$

$$289 - 188 = a^2 + b^2 + c^2$$

$$101 = a^2 + b^2 + c^2$$

Again-

$$a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$$

$$a^3 + b^3 + c^3 - 3abc = (a+b+c) \{a^2 + b^2 + c^2 - (ab+bc+ca)\}$$

$$a^3 + b^3 + c^3 - 3 \times 168 = 17(101 - 94)$$

$$a^3 + b^3 + c^3 - 504 = 17 \times 7$$

$$a^3 + b^3 + c^3 = 119 + 504$$

$$a^3 + b^3 + c^3 = 623$$

45. If $x > 1$ and $x + \frac{1}{x} = \sqrt{29}$, what is the value of

$$x - \frac{1}{x} ?$$

- (a) 3 (b) 4
(c) 5 (d) 2

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (c) $x + \frac{1}{x} = \sqrt{29}$

$$x^2 + \frac{1}{x^2} + 2 = 29 \quad (\text{On squaring of both sides})$$

$$x^2 + \frac{1}{x^2} = 27 \quad \text{--- (i)}$$

$$\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2$$

$$\left(x - \frac{1}{x}\right)^2 = 27 - 2 \quad (\text{From equation (i)})$$

$$x - \frac{1}{x} = \sqrt{25}$$

$$x - \frac{1}{x} = 5$$

46. If $x - y = 1$, then the value of $x^3 - y^3 - 3xy$ will be:

- (a) 2 (b) -1
(c) 0 (d) 1

RRB NTPC 14.03.2021 (Shift-I) Stage I

Ans. (d) $x - y = 1$

$$x^3 - y^3 - 3xy = ?$$

$$(x - y)^3 = x^3 - y^3 - 3xy(x - y)$$

$$\Rightarrow (1)^3 = x^3 - y^3 - 3xy(1)$$

$$\Rightarrow x^3 - y^3 - 3xy = 1$$

47. If $x = \sqrt{3} + \sqrt{2}$, then the value of $x^2 + \frac{1}{x^2}$ is:

- (a) $2\sqrt{3}$ (b) 14
(c) 12 (d) 10

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (d) : $x = \sqrt{3} + \sqrt{2}$

$$\frac{1}{x} = \frac{1}{\sqrt{3} + \sqrt{2}} \times \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} - \sqrt{2}} = \frac{\sqrt{3} - \sqrt{2}}{3 - 2} = \sqrt{3} - \sqrt{2}$$

Then, $\left(x + \frac{1}{x}\right) = \sqrt{3} + \sqrt{2} + \sqrt{3} - \sqrt{2} = 2\sqrt{3}$

$$\therefore x^2 + \frac{1}{x^2} = (2\sqrt{3})^2 - 2$$

$$= 12 - 2 = 10$$

48. Which of the following option is equivalent to?

$$\frac{(x^3 - y^3)(x^2 + 5x + 6)(x^4 - 16)}{(x - y)(x + 3)(x - 2)(x^2 + 4)}$$

- (a) $(x^2 + y^2 - xy)$
 (b) $(x^2 + y^2 + xy)(x + 2)^2$
 (c) $(x^2 + y^2 - xy)(x + 2)^2$
 (d) $(x + 2)^2$

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (b) :

$$\frac{(x^3 - y^3)(x^2 + 5x + 6)(x^4 - 16)}{(x - y)(x + 3)(x - 2)(x^2 + 4)}$$

From Formula- $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
 and $a^2 - b^2 = (a + b)(a - b)$

$$\Rightarrow \frac{(x - y)(x^2 + y^2 + xy)(x^2 + 3x + 2x + 6)(x^2 - 4)(x^2 + 4)}{(x - y)(x + 3)(x - 2)(x^2 + 4)}$$

$$\Rightarrow \frac{(x^2 + y^2 + xy)(x + 3)(x + 2)(x - 2)(x + 2)}{(x + 3)(x - 2)}$$

$$\Rightarrow (x^2 + y^2 + xy)(x + 2)^2$$

49. If x satisfies the equation $x^2 - 2x + 1 = 0$, then the value of $x^3 - \frac{1}{x^3}$ is:

- (a) 1 (b) -1
 (c) 0 (d) $\frac{1}{3}$

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (c) : $x^2 - 2x + 1 = 0$

$$x\left(x - 2 + \frac{1}{x}\right) = 0$$

$$x + \frac{1}{x} = 2$$

On putting, $x = 1$

$$1 + \frac{1}{1} = 2$$

$$x^3 - \frac{1}{x^3} = 1 - 1 = 0$$

50. If $p^2 + q^2 - r^2 = 0$, then the value of $p^6 + q^6 - r^6 \div p^2 q^2 r^2$ is:

(a) 3 (b) -3
 (c) $\frac{1}{3}$ (d) $3pqr$

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) $p^2 + q^2 - r^2 = 0$
 then, $p^6 + q^6 - r^6 = -3 p^2 q^2 r^2$
 (If $a + b - c = 0$ then $a^3 + b^3 - c^3 = -3abc$)

$$\frac{p^6 + q^6 - r^6}{p^2 q^2 r^2} = \frac{-3 p^2 q^2 r^2}{p^2 q^2 r^2} = -3$$

51. If $x^2 y^2 + \frac{1}{x^2 y^2} = 83$, then the value of $xy - \frac{1}{xy}$ is:

- (a) 10 (b) 81
 (c) 85 (d) 9

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (d) : $x^2 y^2 + \frac{1}{x^2 y^2} = 83$

$$\therefore \left(xy - \frac{1}{xy}\right)^2 = x^2 y^2 + \frac{1}{x^2 y^2} - 2$$

$$= 83 - 2 = 81$$

$$\therefore xy - \frac{1}{xy} = 9$$

52. If $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = \sqrt{3}$ and $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 0$ then, find the value of $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}$?

- (a) 0 (b) $\sqrt{3}$
 (c) 3 (d) 6

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 0$$

$$\Rightarrow \frac{1}{\frac{x}{a}} + \frac{1}{\frac{y}{b}} + \frac{1}{\frac{z}{c}} = 0 \quad \text{Let } \left(\frac{x}{a} = p, \frac{y}{b} = q, \frac{z}{c} = r\right)$$

$$\Rightarrow \frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 0$$

$$\frac{qr + pr + pq}{pqr} = 0$$

$$\Rightarrow qr + pr + pq = 0 \dots\dots(i)$$

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = \sqrt{3} \quad \text{Given,}$$

On putting the value-

$$\Rightarrow p + q + r = \sqrt{3}$$

On squaring both sides,

$$\Rightarrow p^2 + q^2 + r^2 + 2(pq + qr + pr) = (\sqrt{3})^2$$

$$\Rightarrow p^2 + q^2 + r^2 + 2 \times 0 = 3 \dots\dots\dots \text{From equation (i)}$$

$$\Rightarrow p^2 + q^2 + r^2 = 3$$

$$\Rightarrow \frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 3$$

53. What is the value of $8x^3 + 18xy + y^3 - 27$ when $2x + y - 3 = 0$.

- (a) 27 (b) -27
(c) 0 (d) 1

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$2x + y - 3 = 0$$

$$(2x + y) = 3 \dots\dots\dots (i)$$

By cubing both sides,

$$(2x + y)^3 = (3)^3$$

$$8x^3 + y^3 + 3 \times 2x \times y(2x + y) = 27$$

$$8x^3 + y^3 + 3 \times 2 \times xy \times 3 = 27$$

$$[\because 2x + y = 3]$$

$$8x^3 + y^3 + 18xy - 27 = 0$$

54. If $3a + 4b = 2$ and $ab = \frac{1}{36}$, then $27a^3 + 64b^3$ is,

- (a) 6 (b) 4
(c) 8 (d) 2

RRB NTPC 17.02.2021 (Shift-I) Stage Ist

Ans. (a) : $3a + 4b = 2$

By cubing both sides,

$$(3a + 4b)^3 = 2^3$$

$$27a^3 + 64b^3 + 36ab(3a + 4b) = 8$$

$$27a^3 + 64b^3 + 36 \times \frac{1}{36} \times (2) = 8$$

$$27a^3 + 64b^3 = 6$$

55. If $p = 5 - 2\sqrt{6}$, then find the value of $p^2 + \frac{1}{p^2}$

- (a) $\sqrt{6} - \sqrt{5}$ (b) 100
(c) $25 + \sqrt{6}$ (d) 98

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (d) : $p = 5 - 2\sqrt{6}$

$$\frac{1}{p} = \frac{1}{5 - 2\sqrt{6}} \times \frac{5 + 2\sqrt{6}}{5 + 2\sqrt{6}} = \frac{5 + 2\sqrt{6}}{25 - 24} = 5 + 2\sqrt{6}$$

$$p + \frac{1}{p} = 10$$

$$p^2 + \frac{1}{p^2} = (10)^2 - 2 = 98$$

56. Solve the following :

$$(x - y)^3 + (y - z)^3 + (z - x)^3 = ?$$

- (a) $3xyz$
(b) $(x - y)(y - z)(z - x)$
(c) $3(x - y)(y - z)(z - x)$
(d) $(x + y + z)(x^2 + y^2 + z^2)$

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (c) : $(x - y)^3 + (y - z)^3 + (z - x)^3$
 $A^3 + B^3 + C^3 = (A + B + C)(A^2 + B^2 + C^2 - AB - BC - CA) + 3ABC$
 $= \{(x - y) + (y - z) + (z - x)\} \{(x - y)^2 + (y - z)^2 + (z - x)^2 - (x - y)(y - z) - (y - z)(z - x) - (z - x)(x - y)\} + 3(x - y)(y - z)(z - x)$
 $= 0 \times \{(x - y)^2 + (y - z)^2 + (z - x)^2 - (x - y)(y - z) - (y - z)(z - x) - (z - x)(x - y)\} + 3(x - y)(y - z)(z - x)$
 $= 3(x - y)(y - z)(z - x)$

57. If $a^2 + b^2 = 82$ and $ab = 9$, find the value of $a^3 + b^3$
 (a) 750 (b) 730 (c) 720 (d) 830

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given-

$$a^2 + b^2 = 82$$

$$ab = 9$$

On adding $2ab$ both sides,

$$a^2 + b^2 + 2ab = 82 + 2ab \quad (\because ab = 9)$$

$$(a + b)^2 = 82 + 18$$

$$(a + b)^2 = 100$$

$$a + b = 10$$

By cubing both sides

$$(a + b)^3 = (10)^3$$

$$a^3 + b^3 + 3ab(a + b) = 1000$$

$$a^3 + b^3 + 3 \times 9(10) = 1000$$

$$a^3 + b^3 = 1000 - 270$$

$$a^3 + b^3 = 730$$

58. If $a^3 - b^3 = 625$, $a^2 - b^2 = 25$ and $a + b = 5$ then the value of $a^2 + ab + b^2$ is:

- (a) 150 (b) 125 (c) 5 (d) 25

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : $a^3 - b^3 = 625$

$$(a - b)(a^2 + b^2 + ab) = 625 \quad \text{--- (i)}$$

$$(a + b) = 5 \quad \text{--- (ii)}$$

$$a^2 - b^2 = 25$$

$$(a + b)(a - b) = 25$$

From equation (ii),

$$a - b = 5 \quad \text{--- (iii)}$$

From equation (i) and equation (iv),

$$5(a^2 + b^2 + ab) = 625$$

$$a^2 + b^2 + ab = 125$$

59. If $(a - 1/a) = 3/4$ then find the value of $(a^3 - 1/a^3)$

- (a) $164/31$ (b) $171/64$
(c) $171/32$ (d) $164/37$

RRB NTPC 19.04.2016 Shift : 1

Ans : (b) $a - \frac{1}{a} = \frac{3}{4}$

By cubing both sides,

$$\left(a - \frac{1}{a}\right)^3 = \frac{27}{64}$$

$$a^3 - \frac{1}{a^3} - 3\left(a - \frac{1}{a}\right) = \frac{27}{64}$$

$$a^3 - \frac{1}{a^3} - 3 \times \frac{3}{4} = \frac{27}{64}$$

$$a^3 - \frac{1}{a^3} = \frac{27}{64} + \frac{9}{4} = \frac{171}{64}$$

60. If $(x^2 + 1/x^2) = 6$ then find the value of $(10x - 10/x)$
- (a) ± 15 (b) ± 20
(c) ± 30 (d) ± 40

RRB NTPC 19.04.2016 Shift : 1

Ans : (b) $x^2 + \frac{1}{x^2} = 6$

On subtracting 2 in both sides,

$$x^2 + \frac{1}{x^2} - 2 = 6 - 2$$

$$\left(x - \frac{1}{x}\right)^2 = 4$$

$$x - \frac{1}{x} = \pm 2 \quad (\text{On multiplying the both side by } 10)$$

$$10x - \frac{10}{x} = \pm 20$$

61. If $(x + 1/x) = 2$, then find the value of $(x^3 + 1/x^3) \div (x^{18} + 1/x^{18})$.
- (a) $2/9$ (b) 5
(c) 1 (d) $1/9$

RRB NTPC 12.04.2016 Shift : 3

Ans : (c) From the question,

$$x + \frac{1}{x} = 2$$

$$x^2 + 1 = 2x$$

$$x^2 - 2x + 1 = 0$$

$$(x - 1)^2 = 0$$

$$x - 1 = 0$$

$$x = 1$$

Now

$$\frac{x^3 + \frac{1}{x^3}}{x^{18} + \frac{1}{x^{18}}} = \frac{1+1}{1+1} = \frac{2}{2} = 1$$

62. Simplify the following expression :

$$\frac{15^3 + 20^3 + 25^3 - 22500}{15^2 + 20^2 + 25^2 - 300 - 500 - 375}$$

(a) 50 (b) 60
(c) 80 (d) 75

RRB NTPC (Stage-2) 16/06/2022 (Shift-I)

Ans. (b) :

$$(a + b + c) = \frac{a^3 + b^3 + c^3 - 3abc}{(a^2 + b^2 + c^2 - ab - bc - ca)}$$

where $a = 15, b = 20, c = 25$

$$(a + b + c) = \frac{15^3 + 20^3 + 25^3 - 22500}{15^2 + 20^2 + 25^2 - 300 - 500 - 375}$$

$$= \frac{15 + 20 + 25}{60}$$

63. If $a^2 + b^2 = 80$ and $a - b = 4$, then $ab = ?$
- (a) 20 (b) 24
(c) 28 (d) 32

RRB NTPC 05.04.2016 Shift-I

Ans : (d) Given-
 $a^2 + b^2 = 80, a - b = 4$
 $\therefore (a - b)^2 = a^2 + b^2 - 2ab$
 $\Rightarrow (4)^2 = 80 - 2ab$
 $\Rightarrow 2ab = 80 - 16$
 $\Rightarrow 2ab = 64$
 $\Rightarrow ab = \frac{64}{2} \Rightarrow ab = 32$

64. If $40x^2 = 334^2 - 134^2$ then value of x^2 is-
- (a) 2340 (b) 234
(c) 1234 (d) 144

RRB NTPC 12.04.2016 Shift : 1

Ans : (a) From the question,
 $40x^2 = 334^2 - 134^2$ $\{a^2 - b^2 = (a+b)(a-b)\}$
 $\Rightarrow 40x^2 = (334 - 134)(334 + 134)$
 $\Rightarrow 40x^2 = 200 \times 468$
 $\Rightarrow x^2 = 2340$

Type - 4 Problems Based on Divisibility of Polynomials

65. If polynomials $4x^3 + ax^2 - 3x + 1$ and $x^4 + x^3 - x^2 + 6$ leave the same remainder when each is divided by $(x+1)$, then the value of a is:
- (a) 4 (b) -1
(c) 5 (d) 9

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (c) : $4x^3 + ax^2 - 3x + 1$ _____ (i)
 $x^4 + x^3 - x^2 + 6$ _____ (ii)

According to the question-

$$4x^3 + ax^2 - 3x + 1 = x^4 + x^3 - x^2 + 6$$

On putting the value of $x = -1$

$$4(-1)^3 + a(-1)^2 - 3(-1) + 1 = (-1)^4 + (-1)^3 - (-1)^2 + 6$$

$$\Rightarrow -4 + a + 3 + 1 = 1 - 1 - 1 + 6$$

$$\Rightarrow a = 5$$

66. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder comes out to be $ax + b$, find a and b
- (a) $a = 1; b = 3$ (b) $a = 3; b = 1$
(c) $a = 1; b = 1$ (d) $a = 1; b = 2$

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) According to the question,

$$\begin{array}{r} 2x^2 + 5 \\ 3x^2 + 4x + 1 \overline{) 6x^4 + 8x^3 + 17x^2 + 21x + 7} \\ \underline{6x^4 + 8x^3 + 2x^2} \\ 15x^2 + 21x + 7 \\ \underline{15x^2 + 20x + 5} \\ x + 2 \end{array}$$

$$\text{Remainder} = x + 2$$

$$\dots (1)$$

$$\text{Given remainder is} = ax + b$$

$$\dots (2)$$

On comparing equation (1) and equation (2)

$$a = 1; b = 2$$

Type - 5

Problems Based on Factorization of Polynomials

67. The factorisation of $x^2 + 11xy + 24y^2$ is :

- (a) $(x - 8y)(x - 3y)$ (b) $(x + 8y)(x - 3y)$
 (c) $(x + 8y)(x + 3y)$ (d) $(x - 8y)(x + 3y)$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c)

$$\begin{aligned} \Rightarrow & x^2 + 11xy + 24y^2 \\ \Rightarrow & x^2 + 8xy + 3xy + 24y^2 \\ \Rightarrow & x(x + 8y) + 3y(x + 8y) \\ \Rightarrow & (x + 8y)(x + 3y) \end{aligned}$$

68. If $(2x-1)$ is a factor of $2x^4 - 7x^3 + x + k = 0$, then find the value of 'k'.

- (a) $\frac{1}{4}$ (b) $-\frac{5}{12}$
 (c) 0 (d) $-\frac{1}{4}$

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question-

$$2x^4 - 7x^3 + x + k = 0 \quad \dots (1)$$

\therefore Equation (1) is divisible by $(2x - 1)$

$$\text{Hence, } 2x - 1 = 0 \Rightarrow x = \frac{1}{2}$$

On putting the value of x in equation(i)

$$2 \times \left(\frac{1}{2}\right)^4 - 7 \times \left(\frac{1}{2}\right)^3 + \frac{1}{2} + k = 0$$

$$\frac{1}{8} - \frac{7}{8} + \frac{1}{2} + k = 0$$

$$-\frac{2}{8} = -k$$

$$\boxed{k = \frac{1}{4}}$$

69. If $x^2 - 1$ is a factor of $ax^4 + bx^3 + cx^2 + dx + e$, then which of the following is a possible relation between the coefficients of powers of x.

- (a) $b + c + d = a + e$ (b) $a + b + c = d + e$
 (c) $a + b + e = c + d$ (d) $a + c + e = b + d$

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d) : $x^2 - 1$ is a factor of $ax^4 + bx^3 + cx^2 + dx + e = 0$

On putting the value of $x = -1$

$$a(-1)^4 + b(-1)^3 + c(-1)^2 + d(-1) + e = 0$$

$$a - b + c - d + e = 0$$

$$\boxed{a + c + e = b + d}$$

70. If $(4y - 1)$ and $(y + 4)$ both are factors of $py^2 + 15y - q$ then:

- (a) $p = 4q$ (b) $p = \frac{q}{4}$
 (c) $p = q$ (d) $p = -q$

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : Given-

$(4y-1)$ and $(y+4)$ both the factors of $py^2 + 15y - q$.

$$4y - 1 = 0 \quad y + 4 = 0$$

$$4y = 1 \quad y = -4$$

$$y = \frac{1}{4}$$

On putting $y = \frac{1}{4}$ in the expression

$$p \times \left(\frac{1}{4}\right)^2 + 15 \times \left(\frac{1}{4}\right) - q = 0$$

$$\frac{p}{16} + \frac{15}{4} - q = 0$$

$$\frac{p + 60 - 16q}{16} = 0$$

$$16q - p = 60 \quad \dots (i)$$

On putting $y = -4$ in the expression

$$p \times (-4)^2 + 15 \times (-4) - q = 0$$

$$16p - 60 - q = 0$$

$$16p - q = 60 \quad \dots (ii)$$

From equation (i) and (ii)

$$16q - p = 16p - q$$

$$17q = 17p$$

$$q = p$$

Hence option (c) is true.

71. If $(x + 1)$ and $(x + 2)$ are factors of $ax^3 + 3x^2 + bx$ then the values of a and b are-

- (a) $a = 2$ and $b = 3$ (b) $a = 3$ and $b = 2$
 (c) $a = 2$ and $b = 1$ (d) $a = 1$ and $b = 2$

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (d) : Given Expression

$$ax^3 + 3x^2 + bx = 0 \quad \dots (i)$$

$\therefore (x + 1)$ is factor of given expression then $x + 1 = 0$

\Rightarrow Putting $x = -1$ in equation (i)

$$-a + 3 - b = 0 \Rightarrow a + b = 3 \quad \dots (ii)$$

And, $(x + 2) = 0$

{ $\therefore (x+2)$, is factor of expression }

\Rightarrow Putting $x = -2$ in equation (i),

$$-8a + 12 - 2b = 0 \Rightarrow 4a + b = 6 \quad \dots (iii)$$

From equation (iii) and (ii)

$$\Rightarrow a = 1$$

Putting the value of a in equation (ii)

$$1 + b = 3 \Rightarrow b = 3 - 1$$

$$\Rightarrow b = 2$$

72. Which of the following is a factor of the polynomial $x^2 - x - 20$?

- (a) $x - 4$ (b) $x - 5$
 (c) $x + 2$ (d) $x + 5$

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) Given,

$$x^2 - x - 20$$

$$= x^2 - 5x + 4x - 20$$

$$= x(x - 5) + 4(x - 5)$$

$$= (x - 5)(x + 4)$$

Hence $(x - 5)$ is a factor of given polynomial.

73. If $(x^4 - 2x^3 + 3x^2 - x + k)$ is a multiple of $(x - 3)$ then value of k is
 (a) 51 (b) -51
 (c) 165 (d) -165

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (b) : $x^4 - 2x^3 + 3x^2 - x + k$,
 $(x - 3)$ is a factor of the given expression,
 \therefore On putting, $x = 3$
 $\Rightarrow (3)^4 - 2 \times (3)^3 + 3(3)^2 - 3 + k = 0$
 $\Rightarrow 81 - 54 + 27 - 3 + k = 0$
 $\Rightarrow 51 + k = 0$
 $\Rightarrow k = -51$

74. Find the factors of $(x^2 + x - 42)$
 (a) $(x+14)(x-3)$ (b) $(x+6)(x-7)$
 (c) $(x-6)(x+7)$ (d) $(x-14)(x+3)$

RRB NTPC 30.03.2016 Shift : 1

Ans : (c) $x^2 + x - 42$
 $= x^2 + 7x - 6x - 42$
 $= x(x + 7) - 6(x + 7)$
 $= (x - 6)(x + 7)$

75. If the factor of $3x^4 - (a + 2)x^3 - x^2 - 4$ is $(x - 2)$, then find the value of 'a'
 (a) 5 (b) -1
 (c) 3 (d) 4

RRB NTPC 22.04.2016 Shift : 1

Ans : (c) Given -
 Factor of $3x^4 - (a + 2)x^3 - x^2 - 4 = (x - 2)$
 $\therefore x - 2$, is a factor
 $\therefore x - 2 = 0 \Rightarrow x = 2$
 $\Rightarrow 3 \times (2)^4 - (a + 2) \times (2)^3 - (2)^2 - 4 = 0$
 $\Rightarrow 3 \times 16 - (a + 2) \times 8 - 4 - 4 = 0$
 $\Rightarrow 48 - 8a - 16 - 8 = 0$
 $\Rightarrow 24 - 8a = 0$
 $\Rightarrow 8a = 24$
 $\Rightarrow a = \frac{24}{8}$
 $\Rightarrow a = 3$

76. Factors of $x^2 - 8x + 12$
 (a) $(x - 6)(x - 2)$ (b) $(x - 6)(x + 2)$
 (c) $(x - 4)^2$ (d) $(x + 6)(x - 2)$

RRB NTPC 27.04.2016 Shift : 1

Ans : (a) $x^2 - 8x + 12$
 $= x^2 - 6x - 2x + 12$
 $= x(x - 6) - 2(x - 6)$
 $= (x - 6)(x - 2)$

77. Factors of $x^2 - 6x + 8$
 (a) $(x - 4)(x - 2)$ (b) $(x + 4)(x + 2)$
 (c) $(x + 8)(x - 2)$ (d) $(x - 4)(x + 2)$

RRB NTPC 29.04.2016 Shift : 2

Ans : (a) Given expression $x^2 - 6x + 8$
 $= x^2 - 4x - 2x + 8$
 $= x(x - 4) - 2(x - 4)$
 $= (x - 4)(x - 2)$

78. Factors of $x^2 + 6x + 8$
 (a) $(x + 4)(x + 2)$ (b) $(x - 4)(x + 2)$
 (c) $(x - 2)$ (d) $(x - 4)(x - 2)$

RRB NTPC 30.04.2016 Shift : 2

Ans : (a) $x^2 + 6x + 8$
 $= x^2 + 4x + 2x + 8$
 $= x(x + 4) + 2(x + 4)$
 $= (x + 4)(x + 2)$

Type - 6

Problems Based on Quadratic Equation and its Discriminant

79. What is the sum of the solutions of the roots of equation $2y^2 - 6y - 7 = 0$?

- (a) $-\frac{7}{2}$ (b) -3
 (c) 3 (d) 7

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,
 Equation

$$2y^2 - 6y - 7 = 0 \text{ — (i)}$$

We know that:-

$$\text{Quadratic equation } ax^2 + bx + c = 0 \text{ — (ii)}$$

On comparing equation I and II,

$$a = 2, b = -6, c = -7$$

$$\text{Hence, sum of roots} = \frac{-b}{a} = \frac{-(-6)}{2} = \frac{6}{2} = 3$$

80. Which of the quadratic equations below will not have real roots?

- (a) $x^2 + 4x - 5 = 0$ (b) $x^2 + 4x + 4 = 0$
 (c) $x^2 + 4x + 5 = 0$ (d) $x^2 + 4x - 4 = 0$

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (c) :

Note :- (i) if $ax^2 + bx + c = 0$ and $b^2 - 4ac > 0$ then

The roots of the equation will be real and unequal

(ii) $ax^2 + bx + c = 0$ and $b^2 - 4ac = 0$ then, The Roots of the equation will be real and equal.

(iii) if $ax^2 + bx + c = 0$ and $b^2 - 4ac < 0$ then, The Roots of the equation imaginary.

From option (c)

$$x^2 + 4x + 5 = 0$$

$$b^2 - 4ac < 0$$

$$(4)^2 - 4 \times 1 \times 5 < 0$$

$$16 - 20 < 0$$

Hence, the roots of the equation are imaginary, that is the roots are not real.

81. If the roots of the equation $2x^2 - 3x + a = 0$ are in the ratio 1:2, then find the value of a.

- (a) 2 (b) 1
 (c) -1 (d) -2

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (b) : Given,

$$2x^2 - 3x + a = 0$$

The ratio of the roots = 1:2 then $a = ?$

Let roots be K and $2K$

According to the question,

$$\alpha + \beta = \frac{-b}{a}$$

$$K + 2K = \frac{-(-3)}{2}$$

$$3K = \frac{3}{2}$$

$$\therefore K = \frac{1}{2}$$

Again, product of roots $(\alpha.\beta) = \frac{c}{a}$

$$K.2K = \frac{a}{2}$$

$$\frac{1}{2} \times 2 \times \frac{1}{2} = \frac{a}{2} \quad (\text{On putting } K = \frac{1}{2})$$

$$a = 1$$

82. If $6y^2 - 13y + 6 = 0$, then find the product of the two roots of the equation.

- (a) 1 (b) -1
(c) $\frac{13}{6}$ (d) $\frac{-13}{6}$

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (a) : Given, equation

$$6y^2 - 13y + 6 = 0$$

On comparing this with the standard form of quadratic equation

$$ax^2 + bx + c = 0$$

$$\text{Where, } a = 6, b = -13, c = 6$$

$$\therefore \text{The product of the roots} = \frac{c}{a} = \frac{6}{6} = 1$$

83. If α and β are the zeros of the polynomial $f(x) = kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, then find the positive value of k .

- (a) $\frac{3}{4}$ (b) $\frac{1}{3}$
(c) $\frac{4}{3}$ (d) $\frac{2}{3}$

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (d) $f(x) = kx^2 + 4x + 4$

On comparing $f(x) = ax^2 + bx + c$

$$a = k, b = 4, c = 4$$

$$\text{Sum of roots } (\alpha + \beta) = \frac{-b}{a} = \frac{-4}{k}$$

$$\text{Product of roots } (\alpha.\beta) = \frac{c}{a} = \frac{4}{k}$$

$$\alpha^2 + \beta^2 = 24 \quad (\text{Given})$$

$$(\alpha + \beta)^2 = \alpha^2 + \beta^2 + 2\alpha.\beta$$

$$\left(\frac{-4}{k}\right)^2 = 24 + \frac{8}{k}$$

$$24k^2 + 8k - 16 = 0$$

$$3k^2 + k - 2 = 0$$

$$3k^2 + 3k - 2k - 2 = 0$$

$$(k + 1)(3k - 2) = 0$$

$$= -1, \frac{2}{3}$$

$$k = \frac{2}{3}$$

84. Which of the following is NOT a quadratic equation?

- (a) $(x + 2)^2 = 2x(x + 1)$
(b) $(x + 1)^2 = 2(x - 3)$
(c) $m(2m + 3) = m^2 + 1$
(d) $x^2 + 3x + 1 = (x - 2)^2$

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (d) : (a) $(x + 2)^2 = 2x(x + 1)$

$$x^2 + 4 + 4x = 2x^2 + 2x \Rightarrow x^2 - 2x - 4 = 0$$

(b) $(x + 1)^2 = 2(x - 3)$

$$x^2 + 1 + 2x = 2x - 6 \Rightarrow x^2 + 7 = 0$$

(c) $m(2m + 3) = m^2 + 1$

$$2m^2 + 3m = m^2 + 1 \Rightarrow m^2 + 3m - 1 = 0$$

(d) $x^2 + 3x + 1 = (x - 2)^2$

$$x^2 + 1 + 3x = x^2 + 4 - 4x \Rightarrow 7x - 3 = 0 \quad (\text{Simple linear equation})$$

Hence option (d) is not a quadratic equation.

85. The equation whose roots are -2 and 3 is :

- (a) $x^2 - x + 6 = 0$ (b) $x^2 - x - 6 = 0$
(c) $x^2 - 5x + 6 = 0$ (d) $x^2 + 3x - 6 = 0$

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (b) : Given roots $\alpha = -2, \beta = 3$

$$\text{Equation } x^2 - (\alpha + \beta)x + \alpha\beta = 0$$

$$x^2 - (-2 + 3)x + (-2)3 = 0$$

$$x^2 - x - 6 = 0$$

86. If the roots of the equation $(4+m)x^2 + (m+1)x + 1 = 0$ are equal, then find the values of m .

- (a) $m = 0, 5$ (b) $m = -1, -3$
(c) $m = 2, 3$ (d) $m = 5, -3$

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (d) : $(4 + m)x^2 + (m + 1)x + 1 = 0$
 \therefore If quadratic equation $ax^2 + bx + c = 0$ have equal roots,
then, $D = b^2 - 4ac = 0$
On comparing we have –
 $(m + 1)^2 - 4 \times (4 + m) \times 1 = 0$
 $m^2 + 1 + 2m - 16 - 4m = 0$
 $m^2 - 2m - 15 = 0$
 $m^2 - 5m + 3m - 15 = 0$
 $m(m - 5) + 3(m - 5) = 0$
 $(m - 5)(m + 3) = 0$
 $\therefore m = 5, -3$

- 87. The Sum of the zeros of the polynomial $5x^2 + (5p - 1)x - (2p + 5)$ is the same as one fourth of their product. Find the value of p.**
(a) -2 (b) 2
(c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (d) : $5x^2 + (5p - 1)x - (2p + 5) = 0$
Sum of zeros = $-\frac{b}{a} = -\frac{(5p-1)}{5}$
Product of zeros = $\frac{c}{a} = -\frac{(2p+5)}{5}$
According to the question,
 $\frac{(5p-1)}{5} = \frac{(2p+5)}{5} \times \frac{1}{4}$
 $20p - 4 = 2p + 5$
 $18p = 9$
 $p = \frac{1}{2}$

- 88. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and also of the quadratic equation $p(kx^2 + x) = 0$ then what are the values of p and k?**
(a) 7, 0.2 (b) 7, -0.2
(c) -7, 0.4 (d) -7, -0.2

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (a) : $2x^2 + px - 15 = 0$, $p(kx^2 + x) = 0$
 \therefore Root = -5
 $\therefore 2 \times (-5)^2 + p(-5) - 15 = 0$
 $p \times 5 = 35$
 $p = 7$
Again, $p(kx^2 + x) = 0$
 $7[k(-5)^2 + (-5)] = 0$
 $7 \times (k \times 25 - 5) = 0$
 $175k - 35 = 0$
 $k = \frac{35}{175}$
 $k = \frac{5}{25} = 0.2$
 $k = 0.2$
Hence the value of p & k is 7 and 0.2 respectively.

- 89. If the sum of the square of the root of the polynomial $x^2 + 8x + 15k$ is 34, then the value of k**
(a) 1 (b) 2
(c) -1 (d) 3

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (a) : Quadratic equation $ax^2 + bx + c = 0$
Sum of roots = $-\frac{b}{a}$
Product of roots = $\frac{c}{a}$
then $a+b = -8$, $ab = 15k$
Let a and b are the root of polynomial
According to the question,
 $a^2 + b^2 = 34$
 $(a + b)^2 - 2ab = 34$
 $(-8)^2 - 30k = 34$
 $64 - 30k = 34$
 $30k = 30$
 $k = 1$

- 90. Which of the following is not a quadratic equation.**
(a) $m(2m+3) = m^2 + 1$
(b) $(y-2)^2 + 1 = 2y - 3$
(c) $x(x+1) + 8 = (x+2)(x-2)$
(d) $(m-2)^3 = m^3 - 4$

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : From option (c),
 $x(x+1) + 8 = (x+2)(x-2)$
 $x^2 + x + 8 = x^2 - 2x + 2x - 4$
 $x^2 + x + 8 - x^2 + 4 = 0$
 $x + 12 = 0$
Hence option (c) is not a quadratic equation.

- 91. If the equations $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$ have a common root, then find the value of a + b (where a is not equal to b)**
(a) 2 (b) -1
(c) 0 (d) 1

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) :
 $x^2 + ax + b = 0$... (i)
 $x^2 + bx + a = 0$... (ii)
 α is a common root of eqⁿ (i) and (ii),
From eqⁿ (i) and (ii)
 $\alpha^2 + a\alpha + b = 0$
 $\alpha^2 + b\alpha + a = 0$
 $\alpha(a - b) + (b - a) = 0$
 $\alpha(a - b) = a - b$
 $\alpha = 1$
Putting the value of α in eqⁿ (i)
 $x^2 + ax + b = 0$
 $1 + a + b = 0$
 $a + b = -1$

92. If the sum of the squares of quadratic polynomial $f(x) = x^2 - 8x + k$ is 40, then find the value of k .

(a) 12 (b) 10
(c) 14 (d) 11

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

$$x^2 - 8x + k = 0 \dots\dots(i)$$

Let the roots of equation are α and β .

$$\text{and } \alpha^2 + \beta^2 = 40$$

From equation (i),

$$\text{Sum of roots } (\alpha + \beta) = \frac{-b}{a}$$

$$\alpha + \beta = 8 \Rightarrow (\alpha + \beta)^2 = 8^2$$

Product of roots $(\alpha \cdot \beta) = k$

$$\alpha^2 + \beta^2 + 2\alpha\beta = 64$$

$$40 + 2 \times k = 64$$

$$2k = 24$$

$$k = 12$$

93. If α and β are the zeroes of the polynomial $x^2 - 5x + m$ such that $\alpha - \beta = 1$, then what will be the value of m .

(a) 3 (b) 6
(c) 10 (d) 2

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (b) : $x^2 - 5x + m = 0$

$$\alpha + \beta = \frac{-b}{a} = \frac{5}{1}$$

$$\alpha - \beta = 1 \dots\dots(i)$$

$$\alpha + \beta = 5 \dots\dots(ii)$$

On adding equation (i) and (ii)

$$2\alpha = 6$$

$$\alpha = 3$$

$$\therefore \beta = 2$$

$$\Rightarrow \alpha\beta = \frac{c}{a} = m$$

$$\therefore m = 3 \times 2 = 6$$

94. If α and β are the zeroes of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, then find the value of k .

(a) 3 (b) 5
(c) 6 (d) 4

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given, $f(x) = x^2 - 5x + k$

$$\alpha - \beta = 1 \dots\dots(i)$$

$$\therefore \text{Sum of roots } (\alpha + \beta) = \frac{\text{Coefficient of } (-x)}{\text{Coefficient of } x^2}$$

$$\alpha + \beta = -(-5)$$

$$\alpha + \beta = 5 \dots\dots(iii)$$

$$\therefore \text{Product of roots } (\alpha \cdot \beta) = \frac{\text{constant term}}{\text{coefficient of } x^2}$$

$$\Rightarrow \alpha \cdot \beta = k$$

From equation (i) and (ii), we have –

$$\alpha - \beta = 1$$

$$\alpha + \beta = 5$$

$$\frac{2\alpha}{2} = \frac{6}{2}$$

$$\alpha = 3 \text{ and } \beta = 2$$

$$\Rightarrow \alpha \cdot \beta = k$$

$$\Rightarrow 3 \cdot 2 = k$$

$$\Rightarrow k = 6$$

95. The roots of the equation $x^2 - 7x + 12 = 0$ are:

(a) 5, 6 (b) 3, 4
(c) 2, 3 (d) 7, 8

RRB NTPC 08.02.2021 (Shift-II) Stage I

Ans. (b) : $x^2 - 7x + 12 = 0$

$$\Rightarrow x^2 - 4x - 3x + 12 = 0$$

$$\Rightarrow x(x - 4) - 3(x - 4) = 0$$

$$\Rightarrow (x - 4)(x - 3) = 0$$

$$\Rightarrow x = 4, x = 3$$

$$\Rightarrow x = 3, 4$$

96. If one of the roots of the equation $x^2 - 19x + 88 = 0$ is 8, then what is the other root?

(a) 13 (b) 11
(c) 17 (d) 12

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (b) : Let the equation $x^2 - 19x + 88 = 0$ have two roots α and β .

According to the question-

$$\alpha = 8$$

$$\text{Product of roots} = 88$$

$$\alpha\beta = 88$$

$$8\beta = 88$$

$$\beta = \frac{88}{8} = 11$$

So, the second root is 11.

97. One root of the equation $2x^2 - 8x - m = 0$, is $\frac{5}{2}$. The other root of the equation and the value of m are respectively.

(a) $-\frac{3}{2}$ and $\frac{15}{2}$ (b) $\frac{5}{2}$ and $-\frac{15}{2}$

(c) $\frac{3}{2}$ and $-\frac{15}{2}$ (d) $-\frac{5}{2}$ and $\frac{15}{2}$

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$\text{First root } (\alpha) = \frac{5}{2}$$

Let second root is β

$$\therefore \text{Sum of roots } (\alpha + \beta) = \frac{\text{Coefficient of } (-x)}{\text{Coefficient of } x^2}$$

$$\frac{5}{2} + \beta = \frac{8}{2}$$

$$\beta = \frac{3}{2}$$

$$\therefore \text{Product of roots } (\alpha \cdot \beta) = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\frac{5}{2} \times \beta = \frac{-m}{2}$$

$$\frac{5}{2} \times \frac{3}{2} = \frac{-m}{2}$$

$$m = \frac{-15}{2}$$

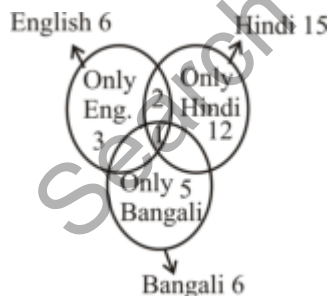
Type - 7 Problems Based on Sets

98. In a group of class 6 students can speak English, 15 students can speak Hindi and 6 can speak Bengali. Nobody can speak any other language. If 2 students in the class can speak two languages and one person can speak all the three languages, then how many students are there in the class?

- (a) 22 (b) 24
(c) 23 (d) 21

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (c)



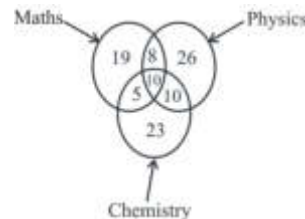
$$\text{Total number of students in class} = 3 + 2 + 12 + 5 + 1 = 23$$

99. In a mid-term exam of class 11, 42% students failed in Mathematics, 54% students failed in Physics and 48% students failed in Chemistry. Only 10% students failed in all the three subjects. 20% students failed in both Physics and Chemistry, 15% students failed in both Chemistry and Mathematics, and 18% students failed in both Physics and Mathematics. What is the percentage of those students who failed in two subjects only?

- (a) 33% (b) 43%
(c) 53% (d) 23%

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : Total number of students = 100%
Venn-diagram of failure students is as follows



$$\text{Percentage of students who failed in two subject} = (8+5+10)\% = 23\%$$

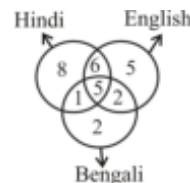
100. In an event, 18 people speak English, 20 persons may speak Hindi. 10 people may speak Bengali. 11 people may speak Hindi and English both, 6 people may speak Hindi & Bengali both, 7 peoples may speak Bengali and English 5 persons may speak all languages.

How many people are in group?

- (a) 33 (b) 60
(c) 29 (d) 48

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (c) :



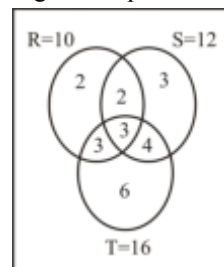
$$\text{Total number of people in the group} = 8 + 6 + 5 + 1 + 5 + 2 + 2 = 29$$

101. R, S and T represent people who like roses, sunflowers and tulips respectively. The number of people is R = 10, S = 12 and T = 16. Three people are such that they like roses, sunflowers and tulip. Two of them like roses and sunflower. Three people like roses and tulips and 4 people like sunflowers and tulip. Then what is the number of people who like only rose?

- (a) 6 (b) 2
(c) 12 (d) 14

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,



It is clear from the diagram that the number of people who like only rose=2

102. In a class 25 students like Maths and History, 25 students like only Hindi, 30 students like only English, 20 students like English and Hindi both, 15 students like only History and 15 students like only Maths. 15 students like all 4 subjects. How many total students are there in the class?

- (a) 130 (b) 145
(c) 125 (d) 140

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (b) : Total number of students
 $= 25 + 25 + 30 + 20 + 15 + 15 + 15 = 145$

103. In a class of 130 students. 15 students like Maths and History. 25 students like only Hindi. 30 students like only English, 20 students like English and Hindi both, 15 students like only History and 15 students like only Maths. Some students like all 4 subjects. If the total number of students who like English is 60, Hindi is 55, Maths and history is 40 then how many students like all 4 subjects?

- (a) 25 (b) 35
(c) 10 (d) 15

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

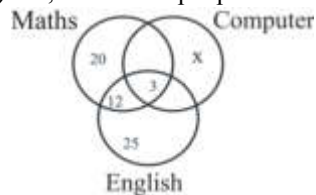
Ans. (c) : As per the question –
 Students who like only Mathematics and History = 15
 Students who like only English and Hindi = 20
 Students who like only Hindi = 25
 Students who like only English = 30
 Students who like only Mathematics = 15
 Students who like only History = 15
 Total students who like English = 60
 Total students who like Hindi = 55
 Total students who like Mathematics and History = 40
 From the above,
 Students who like all three subjects with English
 $= 60 - (30 + 20) = 10$
 Students who like all three subject with Hindi
 $= 55 - (20 + 25) = 10$
 Number of students who like two more subjects with Maths and History = $40 - (15 + 15) = 10$
 Hence number of students who like all four subjects = 10

104. In a class of 65 students, 20 students like only Maths, 25 students like only English and 15 students like both English and Maths. 8 students like Computer and 3 students like all three subjects. There are no students who like Computer and English. Also, there are no students who like Maths and Computer. How many students like only Computer?

- (a) 3 (b) 11
(c) 5 (d) 2

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

- Ans. (c) Let, number of people who like Computer be x.



$$\begin{aligned} \therefore 20 + 25 + 12 + 3 + x &= 65 \\ 60 + x &= 65 \\ x &= 65 - 60 \\ x &= 5 \end{aligned}$$

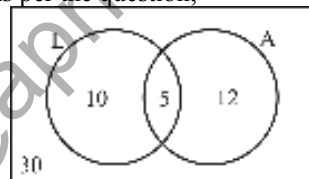
Hence, there are 5 students who like only Computer.

105. L and A are classmates as well as good friends. In a class of 30 students, L has 10 unique friends and 5 friends who are common to A. A has a total of 17 friends in the class. How many students are friends with neither L nor A?

- (a) 5 (b) 2
(c) 4 (d) 3

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

- Ans. (d) : As per the question,



From above diagram,

Number of students who are neither friends of L nor friends of A.

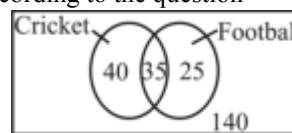
$$\begin{aligned} &= 30 - (10 + 5 + 12) \\ &= 30 - 27 \\ &= 3 \end{aligned}$$

106. Please read the following information carefully and answer the given question. In a group of 140 people, 75 people like to watch cricket and 60 people like to watch football. 35 people like to watch both the games. How many people like to watch at least one sports?

- (a) 100 (b) 110
(c) 95 (d) 90

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

- Ans. (a) : According to the question-



So, those people who like to watch at least one game

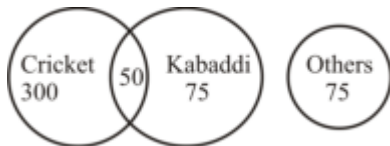
$$\begin{aligned} &= 40 + 35 + 25 \\ &= 100 \end{aligned}$$

107. Out of 500 students in a college, 350 play cricket, 125 play kabaddi, 75 neither play cricket nor play kabaddi. Find the percentage of the number of the students who play both kabaddi and cricket.

- (a) 20% (b) 15%
(c) 12% (d) 10%

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d)



Students playing both cricket and kabaddi = 50
 Total number of students = 500
 Hence, percentage of students who play both games

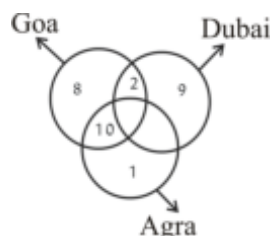
$$= \frac{50}{500} \times 100 = 10\%$$

108. In a group of people, 8 persons like only Goa and 9 persons like only Dubai. There is only one person who likes only Agra, 10 person like both Goa and Agra while 2 persons like both Dubai and Goa. There is no such person who likes both Agra and Dubai and there is no one in the group who likes all three. How many total persons are there in the group

- (a) 42 (b) 30
 (c) 39 (d) 31

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

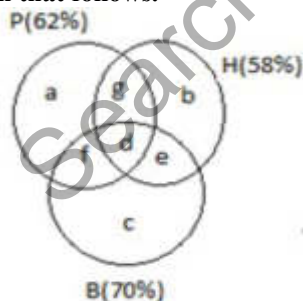
Ans. (b)



Hence from the above diagram the total number of persons in the group

$$= 8 + 2 + 9 + 10 + 1 = 30$$

109. Study the given Venn diagram and answer the question that follows.

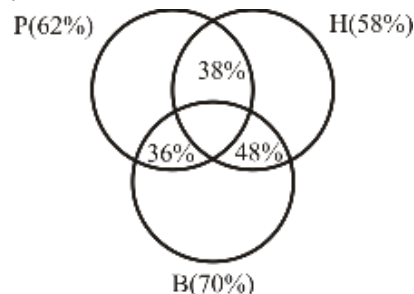


There are 7500 officers in a Stage. Among them, 62% officer punctual (P), 58% officers are honest (H) and 70% officers are brave (B). 38% officers are punctual (P) and honest (H), 48% are honest (H) and brave (B) and 36% are punctual (P) and brave (B). What percentage of officers are punctual (P), honest (H) and brave (B) = ?

- (a) 90% (b) 22%
 (c) 68% (d) 32%

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) :



$$\Rightarrow n(P \cup H \cup B)$$

$$= n(P) + n(H) + n(B) - [n(P \cap H) + n(H \cap B) + n(B \cap P)] + n(P \cap H \cap B)$$

$$100\% = 62\% + 58\% + 70\% - (38 + 48 + 36)\% + n(P \cap H \cap B)$$

$$100\% = 190 - 122 + n(P \cap H \cap B)$$

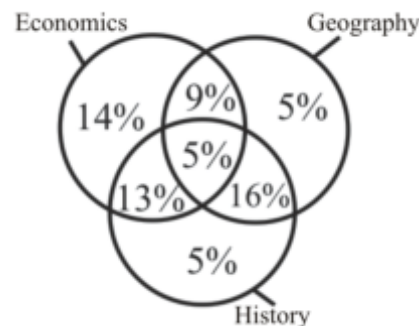
$$\therefore n(P \cap H \cap B) = 100\% - 68\% = 32\%$$

110. In an examination, 41% of students failed in Economics, 35% of students failed in Geography and 39% of students failed in History, 5% of students failed in all the three subjects, 14% of students failed in Economics and Geography, 21% of students failed in Geography and History and 18% of students failed in History and Economics. Find the percentage of students who failed in only Economics.

- (a) 16 % (b) 12 %
 (c) 10 % (d) 14 %

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (d) :



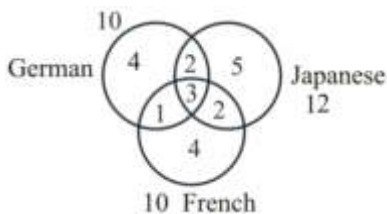
Percentage of students who failed only in Economics = 14%

111. There are 21 persons and there languages – French, German and Japanese. 10 persons speak German, 12 persons speak Japanese, and 10 persons speak French. 4 can speak only French and 5 can speak only Japanese. 4 can speak French as well as German. 3 persons can speak all language. How many persons speak Japanese and German?

- (a) 3 (b) 2
 (c) 4 (d) 1

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) :



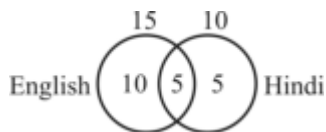
From the above Venn diagram number of people speaking both Japanese and German language = 2.

112. In a group of students, 15 opt for English, 10 opt for Hindi. Five students are studying both languages. How many students are studying only English.

- (a) 25 (b) 10
(c) 5 (d) 15

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) :



Therefore, 10 students are studying only English.

113. 14 people buy item A while 13 people buy item B. Two people buy both items. How many people are there in all?

- (a) 27 (b) 29
(c) 26 (d) 25

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (d) : Let total number of people = x

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$x = 14 + 13 - 2$$

$$x = 27 - 2$$

$$x = 25$$

So, the total numebr of people will be 25.

114. In an examination, 35% students failed in one subject and 42% failed in the other subject, among these 30% failed in both the subjects. If total number of students is 2500 then how many students passed only in one subject?

- (a) 425 (b) 1750
(c) 1050 (d) 750

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (a) : Failed in only one subject means percentage of students passed in

$$= (42 - 30) + (35 - 30)$$

$$= 12 + 5$$

$$= 17 \%$$

$$\text{Hence number of students} = 2500 \times \frac{17}{100}$$

$$= 425$$

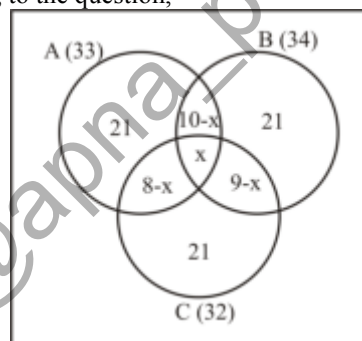
115. Last year, there were three Sections in a competitive exam. Out of them 33 students cleared the cut-off in Section A, 34 students cleared the cut-off in Section B and 32 students cleared the cut-off in Section C. 10 Students cleared the cut-off in Section A and Section B, 9 cleared the cut-off in Section B and Section C and 8 cleared the cut-off in Section A and Section C. The number of students who cleared only one Section was equal and was 21 for each Section. How many students cleared all the three Sections?

- (a) 9 (b) 8
(c) 6 (d) 7

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (c): Suppose number of students cleared all the three Section be x.

According to the question,



Hence, from Section A

$$21 + (10 - x) + x + (8 - x) = 33$$

$$39 - x = 33$$

$$x = 6$$

Hence, number of students who cleared the all three Section is 6.

Type - 8 Miscellaneous

116. If $\frac{x}{2} + \frac{2}{y} = 1$ and $\frac{y}{2} + \frac{2}{z} = 1$, then the value of

$$\frac{z}{2} + \frac{2}{x} \text{ is:}$$

- (a) -1 (b) 1
(c) 0 (d) 2

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : Given,

$$\frac{x}{2} + \frac{2}{y} = 1$$

$$xy + 4 = 2y$$

$$2y - xy = 4$$

$$y = \frac{4}{2 - x} \quad \text{---(i)}$$

$$\frac{y}{2} + \frac{2}{z} = 1$$

$$yz + 4 = 2z \quad \text{---(ii)}$$

On putting the value of y in equation (ii),

$$\frac{4}{(2-x)} \times z + 4 = 2z$$

$$4z + 8 - 4x = 4z - 2xz$$

$$8 - 4x = -2xz$$

$$4 - 2x = -xz$$

$$2x = 4 + xz$$

$$1 = \frac{4}{2x} + \frac{xz}{2x}$$

$$\text{or } \frac{2}{x} + \frac{z}{2} = 1$$

117. The sum of the first 20 terms of the series

$$\frac{1}{5 \times 6} + \frac{1}{6 \times 7} + \frac{1}{7 \times 8} + \dots \text{ is :}$$

- (a) 0.16 (b) 16
(c) 1.6 (d) 0.016

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (a) : Number of terms = $\frac{\text{Last term} - \text{First term}}{\text{Difference}}$

$$20 = \frac{\text{Last term} - 5}{1}$$

$$\text{Last term} = 25$$

$$\text{First term} = 5$$

$$\text{Sum of 20 terms} = \frac{1}{\text{difference}} \left[\frac{1}{\text{first term}} - \frac{1}{\text{last term}} \right]$$

$$= \frac{1}{1} \left[\frac{1}{5} - \frac{1}{25} \right] = \frac{5-1}{25} = \frac{4}{25}$$

$$= \boxed{0.16}$$

118. What is the sum of the following two series?

$$(8 + 27 + 64 + \dots + 1000) + (2 + 4 + 6 + \dots + 20)$$

- (a) 3136 (b) 3134
(c) 3135 (d) 3133

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$(8 + 27 + 64 + \dots + 1000) + (2 + 4 + 6 + \dots + 20)$$

$$= [(2)^3 + (3)^3 + (4)^3 + \dots + (10)^3] + 2(1+2+3+ \dots + 10)$$

$$= [\{(1)^3 + (2)^3 + (3)^3 + (4)^3 + \dots + (10)^3\} - (1)^3] + 2(1+2+3+ \dots + 10)$$

∴ The sum of cubes of the first 'n' natural numbers

$$= \left[\frac{n(n+1)}{2} \right]^2$$

And, sum of the first 'n' natural numbers = $\frac{n(n+1)}{2}$

$$= \left[\frac{10(10+1)}{2} \right]^2 - 1 + 10(10+1)$$

$$= (5 \times 11)^2 - 1 + 10 \times 11$$

$$= (55)^2 - 1 + 110$$

$$= 3025 - 1 + 110$$

$$= 3024 + 110$$

$$= 3134$$

119. If $x^3 - 9x^2 + 26x - 24 = 0$, then which of the values of x given in the options will provide an incorrect solution to the given equation?

- (a) 1 (b) 3
(c) 4 (d) 2

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (a) : Given equation-

$$x^3 - 9x^2 + 26x - 24 = 0$$

$$x^3 - 4x^2 - 5x^2 + 20x + 6x - 24 = 0$$

$$x^2(x-4) - 5x(x-4) + 6(x-4) = 0$$

$$(x^2 - 5x + 6)(x-4) = 0$$

$$(x-2)(x-3)(x-4) = 0$$

$$x = 3, 4, 2$$

Hence, x = 1, will be wrong solution of the given equation.

120. The pair of equations $2^{x+y} = 16$ and $64^{x-y} = 2$ has

- (a) Unique solution $x = \frac{23}{12}, y = \frac{25}{12}$
(b) No common solution
(c) Infinite solutions
(d) Unique solution $x = \frac{25}{12}, y = \frac{23}{12}$

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : $2^{x+y} = 16 \dots (\text{Given})$

$$2^{x+y} = 2^4$$

$$\text{Hence } x+y=4 \dots (i)$$

$$\text{And } 64^{x-y}=2 \dots (\text{Given})$$

$$2^{6(x-y)} = 2^1$$

$$\text{Hence } 6(x-y)=1$$

$$x - y = \frac{1}{6} \dots (ii)$$

On solving eqn (i) and (ii) ,

$$x = \frac{25}{12} \text{ and}$$

$$y = \frac{23}{12} \dots \left(\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \dots (\text{Unique solution}) \right)$$

121. Which of the following is valid for $(a+b)^2 = a^2 + b^2$.

- (a) May be true for only a finite number of (a, b)
(b) May be true for exactly one pair (a, b)
(c) Cannot be true for any set of (a, b)
(d) May be true for infinite number of (a, b)

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) : $(a+b)^2 = a^2 + b^2$

$$\Rightarrow a^2 + b^2 + 2ab = a^2 + b^2$$

$$2ab = 0$$

$$ab = 0$$

$$\Rightarrow a = 0 \text{ or } b = 0$$

$$\therefore (0, b) \text{ or } (a, 0)$$

Here, the value of 'a' and 'b' can be infinite. Thus it can be true for an infinite number of (a, b).

Trigonometry

Type - 1 Problems Based on Trigonometric Functions

1. If $0^\circ < \theta < 90^\circ$ then the value of

$$\frac{\cot \theta - 1}{1 - \tan \theta} \div \left(\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} \right) \text{ is equal to :}$$

- (a) $\frac{\cos \theta}{2}$ (b) $\sin \theta$
(c) $\cos \theta$ (d) $\frac{\sec \theta}{2}$

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

Ans. (a) :

$$\begin{aligned} & \frac{\cot \theta - 1}{1 - \tan \theta} \div \left(\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} \right) \\ &= \frac{1 - \tan \theta}{(1 - \tan \theta) \cdot \tan \theta} \div \left[\frac{\sin^2 \theta + (1 + \cos \theta)^2}{(1 + \cos \theta) \sin \theta} \right] \\ &= \frac{1}{\tan \theta} \div \left[\frac{\sin^2 \theta + 1 + \cos^2 \theta + 2 \cos \theta}{(1 + \cos \theta) \sin \theta} \right] \\ &= \frac{1}{\tan \theta} \div \left[\frac{2(1 + \cos \theta)}{(1 + \cos \theta) \cdot \sin \theta} \right] \\ &= \frac{1}{\tan \theta} \div \frac{2}{\sin \theta} \\ &= \frac{\cos \theta}{\sin \theta} \times \frac{\sin \theta}{2} = \frac{\cos \theta}{2} \end{aligned}$$

2. If $\sqrt{3} \tan 2\theta - 3 = 0$ then find the value of $\tan \theta$
 $\sec \theta - \sin \theta$ ($0 < \theta < 90^\circ$)

- (a) $\frac{1}{6}$ (b) $\frac{5}{6}$
(c) $\frac{2}{3}$ (d) $\frac{2}{3}$

RRB NTPC (Stage-2) 12/06/2022 (Shift-I)

Ans. (a) : $\sqrt{3} \tan 2\theta - 3 = 0$

$$\begin{aligned} \tan 2\theta &= \sqrt{3} \\ \tan 2\theta &= \tan 60^\circ \Rightarrow 2\theta = 60^\circ \Rightarrow \theta = 30^\circ \\ \therefore \tan \theta \cdot \sec \theta - \sin \theta &= \tan 30^\circ \cdot \sec 30^\circ - \sin 30^\circ \\ &= \frac{1}{\sqrt{3}} \times \frac{2}{\sqrt{3}} - \frac{1}{2} = \frac{2}{3} - \frac{1}{2} = \frac{1}{6} \end{aligned}$$

3. If $\cot(A+B) \cdot \cot(A-B) = 1$, then the value of

$$\cot\left(\frac{2A}{3}\right) \text{ is:}$$

- (a) $\frac{\sqrt{3}}{2}$ (b) $\sqrt{3}$
(c) $\frac{\sqrt{2}}{3}$ (d) $\frac{1}{\sqrt{3}}$

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (b) : $\cot(A+B) \cot(A-B) = 1$

$$\begin{aligned} \cot(A+B) &= \tan(A-B) \\ \cot(A+B) &= \cot[90^\circ - (A-B)] \\ A+B &= 90^\circ - (A-B) \\ 2A &= 90^\circ \\ A &= 45^\circ \end{aligned}$$

$$\therefore \cot\left(\frac{2A}{3}\right) = \cot\left(\frac{2 \times 45^\circ}{3}\right) = \cot 30^\circ = \sqrt{3}$$

4. In a triangle ABC, $\tan A + \tan B + \tan C = ?$

- (a) 1
(b) $-\tan A \cdot \tan B \cdot \tan C$
(c) $\tan A \cdot \tan B + \tan B \cdot \tan C + \tan C \cdot \tan A$
(d) $\tan A \cdot \tan B \cdot \tan C$

RRB NTPC 17.02.2021 (Shift-I) Stage Ist

Ans. (d) : $\tan A + \tan B + \tan C = ?$

$$A + B + C = 180^\circ$$

$$A + B = 180^\circ - C$$

$$\tan(A+B) = \tan(180^\circ - C)$$

$$\frac{\tan A + \tan B}{1 - \tan A \cdot \tan B} = -\tan C$$

$$\tan A + \tan B = -\tan C + \tan A \cdot \tan B \cdot \tan C$$

$$\tan A + \tan B + \tan C = \tan A \cdot \tan B \cdot \tan C$$

5. If $\frac{\sec \theta + \tan \theta}{\sec \theta - \tan \theta} = \frac{5}{3}$, then the value of $\sin \theta$ is:

- (a) $\frac{3}{4}$ (b) $\frac{2}{3}$
(c) $\frac{1}{4}$ (d) $\frac{1}{3}$

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (c) : Given that,

$$\frac{\sec \theta + \tan \theta}{\sec \theta - \tan \theta} = \frac{5}{3}$$

$$3(\sec \theta + \tan \theta) = 5(\sec \theta - \tan \theta)$$

$$3 \sec \theta + 3 \tan \theta = 5 \sec \theta - 5 \tan \theta$$

$$2 \sec \theta = 8 \tan \theta$$

$$2 \times \frac{1}{\cos \theta} = \frac{8 \sin \theta}{\cos \theta}$$

$$2 = 8 \sin \theta$$

$$\sin \theta = \frac{2}{8} = \frac{1}{4}$$

$$\text{Hence, } \sin \theta = \frac{1}{4}$$

6. In a triangle, right-angled at B, AB = 12 cm and BC = 5 cm. What will be the value of

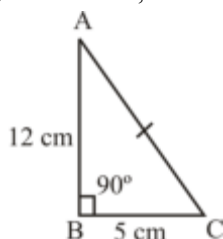
(i) $\sin A \cos A$

(ii) $\sin C \cos C$ respectively ?

- (a) $\frac{60}{169}, \frac{60}{169}$ (b) $\frac{25}{169}, \frac{60}{169}$
 (c) $\frac{60}{169}, \frac{25}{169}$ (d) $\frac{26}{169}, \frac{25}{169}$

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (a) : Given that,



From Pythagoras theorem

$$AC^2 = AB^2 + BC^2$$

$$= 144 + 25$$

$$AC = \sqrt{169}$$

$$AC = 13$$

$$(i) \sin A \times \cos A \left(\begin{array}{l} \because \sin \theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}} \\ \cos \theta = \frac{\text{Base}}{\text{Hypotenuse}} \end{array} \right)$$

$$= \frac{5}{13} \times \frac{12}{13}$$

$$= \frac{60}{169}$$

$$(ii) \sin C \times \cos C$$

$$= \frac{12}{13} \times \frac{5}{13}$$

$$= \frac{60}{169}$$

7. What is the value of the following expression?

$$\frac{\cos 3x + \cos x}{\sin 3x - \sin x}$$

$$\frac{\sin 3x - \sin x}{\sin 3x - \sin x}$$

$$(a) \sin x$$

$$(b) \cot x$$

$$(c) \cos x$$

$$(d) \tan x$$

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given that,

$$\frac{\cos 3x + \cos x}{\sin 3x - \sin x}$$

$$\frac{\sin 3x - \sin x}{\sin 3x - \sin x}$$

We know that-

$$\cos \alpha + \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cdot \cos \frac{\alpha - \beta}{2}$$

$$\sin \alpha - \sin \beta = 2 \sin \frac{\alpha - \beta}{2} \cdot \cos \frac{\alpha + \beta}{2}$$

$$\frac{2 \cos \frac{3x + x}{2} \cdot \cos \frac{3x - x}{2}}{2 \sin \frac{3x - x}{2} \cdot \cos \frac{3x + x}{2}} = \frac{2 \cos 2x \cdot \cos x}{2 \sin x \cdot \cos 2x}$$

$$= \frac{\cos x}{\sin x} = \cot x$$

8. Simplify the following.

$$\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}}$$

$$(a) \sin \theta$$

$$(b) \cos \theta$$

$$(c) 2 \cos \theta$$

$$(d) \cos 2\theta$$

RRB NTPC 08.02.2021 (Shift-II) Stage I

$$\text{Ans. (c) : } \sqrt{2 + \sqrt{2 + 2 \cos 4\theta}}$$

$$\left\{ \begin{array}{l} \cos 2\theta = 2 \cos^2 \theta - 1 \\ 2 \cos^2 \theta = 1 + \cos 2\theta \end{array} \right\}$$

$$\Rightarrow \sqrt{2 + \sqrt{2(1 + \cos 4\theta)}}$$

$$\Rightarrow \sqrt{2 + \sqrt{2 \times 2 \cos^2 2\theta}}$$

$$\Rightarrow \sqrt{2 + 2 \cos 2\theta}$$

$$\Rightarrow \sqrt{2.2 \cos^2 \theta}$$

$$\Rightarrow 2 \cos \theta$$

9. The value of $4 \cos \left(\frac{\pi}{6} - \alpha \right) \sin \left(\frac{\pi}{3} - \alpha \right)$ is

equal to :

$$(a) 3 + 4 \sin^2 \alpha$$

$$(b) 3 + \sin^2 \alpha$$

$$(c) 3 - \sin^2 \alpha$$

$$(d) 3 - 4 \sin^2 \alpha$$

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given that,

$$4 \cos \left(\frac{\pi}{6} - \alpha \right) \sin \left(\frac{\pi}{3} - \alpha \right)$$

$$\text{सूत्र- } 2 \cos A \cdot \sin B = \sin(A+B) - \sin(A-B)$$

$$\Rightarrow 2 \left[\sin \left(\frac{\pi}{6} - \alpha + \frac{\pi}{3} - \alpha \right) - \sin \left(\frac{\pi}{6} - \alpha - \frac{\pi}{3} + \alpha \right) \right]$$

$$\Rightarrow 2 \sin \left(\frac{3\pi}{6} - 2\alpha \right) - \sin \left(\frac{-\pi}{6} \right)$$

$$\Rightarrow 2 \sin \left(\frac{\pi}{2} - 2\alpha \right) + \sin \frac{\pi}{6}$$

$$\Rightarrow 2 \left[\cos 2\alpha + \frac{1}{2} \right]$$

$$\Rightarrow 2 \cos 2\alpha + 1$$

$$\Rightarrow 2[1 - 2 \sin^2 \alpha] + 1$$

$$\Rightarrow 2 - 4 \sin^2 \alpha + 1$$

$$\Rightarrow 3 - 4 \sin^2 \alpha$$

10. If A, B and C are the interior angles of a ΔABC , Simplify :

$$\frac{\cos^2\left(\frac{B+C}{2}\right) + \cos^2\frac{A}{2}}{\sec^2\frac{C}{2} - \cot^2\left(\frac{A+B}{2}\right)}$$

- (a) 0 (b) 2
(c) 1 (d) Not defined

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) :
$$\frac{\cos^2\left(\frac{B+C}{2}\right) + \cos^2\frac{A}{2}}{\sec^2\frac{C}{2} - \cot^2\left(\frac{A+B}{2}\right)}$$

($\because \angle A, \angle B$ and $\angle C$ are the interior angles of ΔABC)
Then $\angle A + \angle B + \angle C = 180^\circ$
Dividing both side by 2
$$\frac{\angle A}{2} + \frac{\angle B}{2} + \frac{\angle C}{2} = \frac{180^\circ}{2}$$

$$\frac{\cos^2\left(\frac{180^\circ}{2} - \frac{A}{2}\right) + \cos^2\frac{A}{2}}{\sec^2\frac{C}{2} - \cot^2\left(\frac{180^\circ}{2} - \frac{C}{2}\right)} \quad \left(\begin{array}{l} \because \cos(90^\circ - \theta) = \sin \theta \\ \cot(90^\circ - \theta) = \tan \theta \\ \sin^2 \theta + \cos^2 \theta = 1 \\ \sec^2 \theta - \tan^2 \theta = 1 \end{array} \right)$$

$$= \frac{\sin^2\frac{A}{2} + \cos^2\frac{A}{2}}{\sec^2\frac{C}{2} - \tan^2\frac{C}{2}} = 1$$

11. The expression $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A}$ can be written as ;

- (a) $1 + \sec A \operatorname{cosec} A$ (b) $\tan A + \cot A$
(c) $\sec A + \cot A$ (d) $1 + \sin A \cos A$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (a) Given that,

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A}$$

$$= \frac{\sin A}{\cos A} \times \frac{1}{1 - \frac{\cos A}{\sin A}} + \frac{\cos A}{\sin A} \times \frac{1}{1 - \frac{\sin A}{\cos A}}$$

$$= \frac{\sin^2 A}{\cos A(\sin A - \cos A)} + \frac{\cos^2 A}{\sin A(\cos A - \sin A)}$$

$$= \frac{\sin^2 A}{\cos A(\sin A - \cos A)} - \frac{\cos^2 A}{\sin A(\sin A - \cos A)}$$

$$= \frac{1}{\sin A - \cos A} \left[\frac{\sin^3 A - \cos^3 A}{\sin A \cos A} \right]$$

$$(a^3 - b^3) = (a - b)(a^2 + b^2 + ab)$$

$$= \frac{1}{(\sin A - \cos A)} \left[\frac{(\sin A - \cos A)(\sin^2 A + \cos^2 A + \sin A \cos A)}{\sin A \cos A} \right]$$

$$= \frac{1 + \sin A \cos A}{\sin A \cos A}$$

$$= \frac{1}{\sin A \cos A} + \frac{\sin A \cos A}{\sin A \cos A}$$

$$= \frac{1}{\sin A \cos A} + 1$$

$$= \sec A \operatorname{cosec} A + 1$$

12. Solve the following equation-

$$\frac{\tan A}{1 + \sec A} + \frac{1 + \sec A}{\tan A} = ?$$

- (a) $2 \sec A$ (b) $2 \cos A$
(c) $2 \sin A$ (d) $2 \operatorname{cosec} A$

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (d) : From question,

$$\frac{\tan A}{1 + \sec A} + \frac{1 + \sec A}{\tan A} = ?$$

$$= \frac{\sin A / \cos A}{1 + \frac{1}{\cos A}} + \frac{1 + \frac{1}{\cos A}}{\sin A / \cos A}$$

$$= \frac{\sin A}{1 + \cos A} + \frac{\cos A + 1}{\sin A}$$

$$= \frac{\sin^2 A + 1 + \cos^2 A + 2 \cos A}{\sin A(1 + \cos A)} \quad [\because \sin^2 A + \cos^2 A = 1]$$

$$= \frac{2(1 + \cos A)}{\sin A(1 + \cos A)} = \frac{2}{\sin A}$$

$$= 2 \operatorname{cosec} A$$

13. The value of $\sqrt{\frac{1 + \cos 2A}{1 - \cos 2A}}$ = ? (Note- A is non zero)

- (a) $\tan A$ (b) $\cos A$
(c) $\sin A$ (d) $\cot A$

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (d) :

$$\sqrt{\frac{1 + \cos 2A}{1 - \cos 2A}} = \sqrt{\frac{1 + (2 \cos^2 A - 1)}{1 - (1 - 2 \sin^2 A)}}$$

$$= \sqrt{\frac{1 + 2 \cos^2 A - 1}{1 - 1 + 2 \sin^2 A}}$$

$$= \sqrt{\frac{2 \cos^2 A}{2 \sin^2 A}}$$

$$= \sqrt{\cot^2 A} = \cot A$$

14. Which of the following is a simplified form of the expression :

$\sin A \cos A (\tan A - \cot A)$, where $(0^\circ \leq A \leq 90^\circ)$

- (a) $2 \cos^2 A - 1$ (b) $2 \sin^2 A - 1$
(c) 1 (d) $1 - \cos^2 A$

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (b) : $\sin A \cos A (\tan A - \cot A)$

$$= \sin A \cos A \left(\frac{\sin A}{\cos A} - \frac{\cos A}{\sin A} \right)$$

$$= \sin A \cdot \cos A \left(\frac{\sin^2 A - \cos^2 A}{\sin A \cdot \cos A} \right)$$

$$= \sin^2 A - \cos^2 A$$

$$= \sin^2 A - (1 - \sin^2 A)$$

$$= \sin^2 A - 1 + \sin^2 A$$

$$= 2\sin^2 A - 1$$

15. If $r \sin \theta = \frac{7}{2}$ and $r \cos \theta = \frac{7\sqrt{3}}{2}$ then what will be the value of r ?

- (a) $\sqrt{3}$ (b) 5
(c) 7 (d) -1

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (c) Given that,

$$r \sin \theta = \frac{7}{2} \quad \dots\dots\dots (i)$$

$$\text{and } r \cos \theta = \frac{7\sqrt{3}}{2} \quad \dots\dots\dots (ii)$$

From equation (i)² + equation (ii)²

$$r^2 (\sin^2 \theta + \cos^2 \theta) = \frac{49}{4} + \frac{147}{4}$$

$$r^2 = \frac{196}{4}$$

$$r = \frac{14}{2}$$

$$r = 7$$

16. If $a \cos \theta - b \sin \theta = c$, then find the value of $a \sin \theta + b \cos \theta$.

- (a) $\sqrt{a^2 + b^2 + c^2}$ (b) $\pm \sqrt{a^2 + b^2 - c^2}$
(c) $\pm \sqrt{a^2 + c^2 - b^2}$ (d) $\sqrt{b^2 + c^2 - a^2}$

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given that,

$$a \cos \theta - b \sin \theta = c$$

On squaring both sides

$$(a \cos \theta - b \sin \theta)^2 = c^2$$

$$a^2 \cos^2 \theta + b^2 \sin^2 \theta - 2ab \sin \theta \times \cos \theta = c^2$$

$$a^2 (1 - \sin^2 \theta) + b^2 (1 - \cos^2 \theta) - 2ab \sin \theta \times \cos \theta = c^2$$

$$a^2 - a^2 \sin^2 \theta + b^2 - b^2 \cos^2 \theta - 2ab \sin \theta \times \cos \theta = c^2$$

$$a^2 + b^2 - c^2 = a^2 \sin^2 \theta + b^2 \cos^2 \theta + 2ab \sin \theta \times \cos \theta$$

$$a^2 + b^2 - c^2 = (a \sin \theta + b \cos \theta)^2$$

$$a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$$

17. If $\cos \theta + \sin \theta = m$, $\sec \theta + \csc \theta = n$, then what is the value of m/n ?

- (a) 1 (b) $\sin \theta \cos \theta$
(c) $\sec \theta \csc \theta$ (d) $\cot \theta \tan \theta$

RRB NTPC 03.04.2016 Shift : 1

Ans : (b) Given,

$$\cos \theta + \sin \theta = m \quad \dots\dots\dots (i)$$

And, $\sec \theta + \csc \theta = n \quad \dots\dots\dots (ii)$

$$\frac{1}{\cos \theta} + \frac{1}{\sin \theta} = n$$

$$\Rightarrow \frac{\sin \theta + \cos \theta}{\cos \theta \sin \theta} = n$$

$$\Rightarrow \frac{m}{\cos \theta \sin \theta} = n \quad [\text{From equation (i)}]$$

$$\Rightarrow \frac{m}{n} = \sin \theta \cos \theta$$

18. If $1 + \tan \theta = \sqrt{3}$, then $\sqrt{3} \cot \theta - 1 = ?$

- (a) $\frac{2\sqrt{3}-1}{2}$ (b) $\frac{2\sqrt{3}+1}{2}$
(c) $\frac{\sqrt{3}-1}{2}$ (d) $\frac{\sqrt{3}+1}{2}$

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : $1 + \tan \theta = \sqrt{3}$

$$\tan \theta = \sqrt{3} - 1$$

$$\frac{1}{\cot \theta} = \sqrt{3} - 1$$

$$\cot \theta = \frac{1}{\sqrt{3} - 1}$$

On multiplying the numerator and denominator by $(\sqrt{3} + 1)$,

$$\cot \theta = \frac{\sqrt{3} + 1}{(\sqrt{3} - 1)(\sqrt{3} + 1)}$$

$$\cot \theta = \frac{\sqrt{3} + 1}{2}$$

$$\sqrt{3} \cot \theta - 1$$

$$= \sqrt{3} \times \left(\frac{\sqrt{3} + 1}{2} \right) - 1 \quad (\text{On putting the value of } \cot \theta)$$

$$= \frac{3 + \sqrt{3} - 2}{2}$$

$$= \frac{\sqrt{3} + 1}{2}$$

19. If $\tan \theta = x - \frac{1}{4x}$, then $\sec \theta - \tan \theta$ is equal to:

- (a) $2x$ or $\frac{1}{2x}$ (b) $-2x$ or $\frac{1}{2x}$
(c) $2x$ or $\frac{1}{2x}$ (d) $2x$ or $-\frac{1}{2x}$

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given,

$$\sec^2 \theta = 1 + \tan^2 \theta$$

$$\sec^2 \theta = 1 + \left(x - \frac{1}{4x}\right)^2 \quad \left\{ \because \tan \theta = x - \frac{1}{4x} \right\}$$

$$\sec^2 \theta = 1 + x^2 + \frac{1}{16x^2} - 2 \cdot x \cdot \frac{1}{4x}$$

$$\sec^2 \theta = 1 + x^2 + \frac{1}{16x^2} - \frac{1}{2}$$

$$\sec^2 \theta = \frac{1}{2} + x^2 + \frac{1}{16x^2}$$

$$\sec^2 \theta = \left(x + \frac{1}{4x}\right)^2$$

$$\sec \theta = \pm \left(x + \frac{1}{4x}\right)$$

then, $\sec \theta - \tan \theta$

$$= x + \frac{1}{4x} - x + \frac{1}{4x} \quad \left\{ \text{On taking } \sec \theta = + \left(x + \frac{1}{4x}\right) \right\}$$

$$= \frac{1}{2x}$$

Again, $\sec \theta - \tan \theta$

$$= -x - \frac{1}{4x} - x + \frac{1}{4x} \quad \left\{ \text{On taking } \sec \theta = - \left(x + \frac{1}{4x}\right) \right\}$$

$$= -2x$$

Hence, option (b) is correct.

20. If $\sin \theta = 5/13$, then find the value of $\cos \theta$.

- (a) $8/13$ (b) $12/13$
(c) $23/13$ (d) 1

RRB NTPC 04.04.2016 Shift : 1

Ans : (b) $\sin \theta = \frac{5}{13}$

$$\sin^2 \theta = \frac{25}{169}$$

$$\cos \theta = \sqrt{1 - \sin^2 \theta} = \sqrt{1 - \frac{25}{169}} = \sqrt{\frac{144}{169}} = \frac{12}{13}$$

21. If $5 \tan \theta = 4$, find the value of $(3 \sin \theta - 2 \cos \theta) \div (2 \sin \theta + 3 \cos \theta)$.

- (a) $6/23$ (b) $2/23$
(c) $4/23$ (d) $5/23$

RRB NTPC 31.03.2016 Shift : 3

Ans : (b) Given-

$$5 \tan \theta = 4 \Rightarrow \tan \theta = \frac{4}{5}$$

$$\frac{3 \sin \theta - 2 \cos \theta}{2 \sin \theta + 3 \cos \theta}$$

$$= \frac{3 \left(\frac{\sin \theta}{\cos \theta}\right) - 2 \left(\frac{\cos \theta}{\cos \theta}\right)}{2 \left(\frac{\sin \theta}{\cos \theta}\right) + 3 \left(\frac{\cos \theta}{\cos \theta}\right)}$$

(On dividing the numerator and denominator by $\cos \theta$)

$$= \frac{3 \tan \theta - 2 \times 1}{2 \tan \theta + 3} = \frac{3 \times \frac{4}{5} - 2}{2 \times \frac{4}{5} + 3} = \frac{\frac{12-10}{5}}{\frac{8+15}{5}} = \frac{2}{23}$$

22. If $2(\cos \theta + \sec \theta) = 5$, then find the value of $\sec^2 \theta + \cos^2 \theta$?

- (a) $\frac{4}{17}$ (b) $\frac{17}{4}$
(c) $\frac{25}{2}$ (d) $\frac{25}{2}$

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (b) : Given,

$$2(\cos \theta + \sec \theta) = 5$$

$$\cos \theta + \sec \theta = \frac{5}{2}$$

On squaring both sides,

$$(\cos \theta + \sec \theta)^2 = \left(\frac{5}{2}\right)^2$$

$$\cos^2 \theta + \sec^2 \theta + 2 \cos \theta \cdot \sec \theta = \frac{25}{4}$$

$$\cos^2 \theta + \sec^2 \theta + 2 = \frac{25}{4}$$

$$\cos^2 \theta + \sec^2 \theta = \frac{25}{4} - 2$$

$$\cos^2 \theta + \sec^2 \theta = \frac{17}{4}$$

23. If $\tan \theta + \cot \theta = 5$, then the value of $\tan^2 \theta + \cot^2 \theta + 2 \tan^2 60^\circ$ is:

- (a) $10\sqrt{3}$ (b) $29\sqrt{3}$
(c) 25 (d) 29

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$\tan \theta + \cot \theta = 5$$

$$\tan \theta + \frac{1}{\tan \theta} = 5$$

$$\tan^2 \theta + \frac{1}{\tan^2 \theta} + 2 = 25 \dots (\text{On squaring both sides})$$

$$\tan^2 \theta + \cot^2 \theta = 23$$

$$\text{then, } \tan^2 \theta + \cot^2 \theta + 2 \tan^2 60^\circ$$

$$23 + 2 \times 3 = 29$$

24. If $\cos x + \frac{1}{\cos x} = 2$, then find the value of

$$\cos^n x + \frac{1}{\cos^n x}$$

- (a) 8 (b) 6
(c) 2 (d) 4

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (c) : $\cos x + \frac{1}{\cos x} = 2 \dots (\text{Given})$

On taking $x = 0^\circ$

$$\cos 0^\circ + \frac{1}{\cos 0^\circ} = 2$$

$$1 + \frac{1}{1} = 2$$

$$2 = 2$$

So, substituting $x=0^\circ$ in $\cos^n x + \frac{1}{\cos^n x}$

$$\cos^n 0^\circ + \frac{1}{\cos^n 0^\circ}$$

$$= (1)^n + \frac{1}{(1)^n}$$

$$= 1 + \frac{1}{1} = 2$$

Hence, $\cos^n x + \frac{1}{\cos^n x}$ will be 2.

25. If $\cos^4 \theta - \sin^4 \theta = \frac{3}{5}$, then find the value

$$1 - 2\sin^2 \theta + 2\sin \theta \cos \theta$$

(a) 0 (b) $\frac{8}{5}$

(c) $\frac{9}{5}$ (d) $\frac{7}{5}$

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (d) : Given,

$$\cos^4 \theta - \sin^4 \theta = \frac{3}{5}$$

$$(\cos^2 \theta + \sin^2 \theta)(\cos^2 \theta - \sin^2 \theta) = \frac{3}{5}$$

$$\cos^2 \theta - \sin^2 \theta = \frac{3}{5}$$

$$\cos 2\theta = \frac{3}{5} \quad (\because \cos^2 \theta - \sin^2 \theta = \cos 2\theta)$$

then, $(1 - 2\sin^2 \theta) + 2\sin \theta \cos \theta$

$$\cos 2\theta + \sin 2\theta \quad \left[\begin{array}{l} \because \cos 2\theta = 1 - 2\sin^2 \theta \\ \sin 2\theta = 2\sin \theta \cos \theta \end{array} \right]$$

$$\cos 2\theta + \sqrt{1 - \cos^2 2\theta}$$

$$\frac{3}{5} + \sqrt{1 - \frac{9}{25}}$$

$$\frac{3}{5} + \frac{4}{5} = \frac{7}{5}$$

26. If $\sin \theta + \operatorname{cosec} \theta = 2$ then the value of $\sin^8 \theta + \operatorname{cosec}^8 \theta$ is:

(a) 2^4 (b) 2
(c) 1 (d) 2^8

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) $\sin \theta + \operatorname{cosec} \theta = 2$

$$\sin \theta + \frac{1}{\sin \theta} = 2$$

$$\sin^2 \theta - 2\sin \theta + 1 = 0$$

$$(\sin \theta - 1)^2 = 0$$

$$\sin \theta = 1$$

$$\sin \theta = \sin 90^\circ$$

$$\boxed{\theta = 90^\circ}$$

$$? = \sin^8 \theta + \operatorname{cosec}^8 \theta$$

$$= \sin^8 90^\circ + \operatorname{cosec}^8 90^\circ$$

$$= (1)^8 + (1)^8$$

$$= 1 + 1$$

$$= 2$$

Type - 2

Problems Based on Angular Value

27. If $\operatorname{cosec} \theta \times \tan \theta = \frac{2}{\sqrt{3}}$ and θ is an acute angle

then find the value of θ :

(a) 30° (b) 60°
(c) 90° (d) 45°

RRB NTPC (Stage-2) 16/06/2022 (Shift-II)

Ans. (a) : Given -

$$\operatorname{cosec} \theta \times \tan \theta = \frac{2}{\sqrt{3}}$$

From the option (a) putting the value of $\theta = 30^\circ$

$$\operatorname{cosec} 30^\circ \times \tan 30^\circ = \frac{2}{\sqrt{3}}$$

$$2 \times \frac{1}{\sqrt{3}} = \frac{2}{\sqrt{3}}$$

$$\frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}}$$

$$\text{LHS} = \text{RHS}$$

Hence $\theta = 30^\circ$

28. When $\alpha = 30^\circ$, then find the value of $\sin \alpha \cos \alpha$:

(a) $\frac{\sqrt{3}}{4}$ (b) $\frac{3}{4}$
(c) $\frac{\sqrt{3}}{3}$ (d) $\frac{\sqrt{3}}{2}$

RRB NTPC (Stage-2) 17/06/2022 (Shift-II)

Ans. (a) : Given

$$\alpha = 30^\circ, \text{ then } \sin \alpha \cos \alpha = ?$$

$$\sin 30^\circ \cos 30^\circ$$

$$= \frac{1}{2} \times \frac{\sqrt{3}}{2}$$

$$= \boxed{\frac{\sqrt{3}}{4}}$$

29. Solve the following :
 $\sin 60^\circ + \tan 30^\circ + \cos 45^\circ$

- (a) $\frac{3\sqrt{2} + 5\sqrt{3}}{4}$ (b) $\frac{5\sqrt{2} + 3\sqrt{3}}{4}$
 (c) $\frac{3\sqrt{2} + 5\sqrt{3}}{6}$ (d) $\frac{5\sqrt{2} + 3\sqrt{3}}{6}$

RRB NTPC (Stage-2) 15/06/2022 (Shift-I)

Ans. (c) : $\sin 60^\circ + \tan 30^\circ + \cos 45^\circ$

$$\begin{aligned} &= \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{2}} \\ &= \frac{3\sqrt{2} + 2\sqrt{2} + 2\sqrt{3}}{2\sqrt{6}} \\ &= \frac{2\sqrt{3} + 5\sqrt{2}}{2\sqrt{6}} \times \frac{2\sqrt{6}}{2\sqrt{6}} \\ &= \frac{4 \times 3\sqrt{2} + 10 \times 2\sqrt{3}}{4 \times 6} \\ &= \frac{4(3\sqrt{2} + 5\sqrt{3})}{4 \times 6} \\ &= \frac{3\sqrt{2} + 5\sqrt{3}}{6} \end{aligned}$$

30. If $\sin^2 \beta - \sin 30^\circ = 0$ and find the value of β :

- (a) 45° (b) 0°
 (c) 90° (d) 60°

RRB NTPC (Stage-2) 15/06/2022 (Shift-III)

Ans. (a) :

$$\text{If } \sin^2 \beta - \sin 30^\circ = 0$$

$$\sin^2 \beta = \sin 30^\circ$$

$$\sin^2 \beta = \frac{1}{2}$$

$$\sin \beta = \frac{1}{\sqrt{2}}$$

$$\sin \beta = \sin 45^\circ$$

$$\beta = 45^\circ$$

31. Find the value of

$$\frac{\cos^2 22^\circ + \cos^2 68^\circ}{2(\sin^2 22^\circ + \sin^2 68^\circ)} - \sin^2 16^\circ - \cos 16^\circ \sin 74^\circ$$

- (a) $\frac{3}{2}$ (b) 2
 (c) $-\frac{1}{2}$ (d) 0

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) :

$$\begin{aligned} &\frac{\cos^2 22^\circ + \cos^2 68^\circ}{2(\sin^2 22^\circ + \sin^2 68^\circ)} - \sin^2 16^\circ - \cos 16^\circ \sin 74^\circ \\ &= \frac{\cos^2 22^\circ + \cos^2 (90^\circ - 22^\circ)}{2(\sin^2 22^\circ + \sin^2 (90^\circ - 22^\circ))} \\ &\quad - (\sin^2 16^\circ + \cos 16^\circ \cdot \sin(90 - 16^\circ)) \end{aligned}$$

$$\begin{aligned} &= \frac{\cos^2 22^\circ + \sin^2 22^\circ}{2(\sin^2 22^\circ + \cos^2 22^\circ)} \\ &\quad - (\sin^2 16^\circ + \cos 16^\circ \cdot \cos 16^\circ) \\ &= \frac{1}{2 \times 1} - (\sin^2 16^\circ + \cos^2 16^\circ) \\ &= \frac{1}{2} - 1 \\ &= -\frac{1}{2} \end{aligned}$$

32. If $\sqrt{\frac{1 - \cos 2\theta}{1 + \cos 2\theta}} = \frac{1}{\sqrt{3}}$, then the value of θ is:

- (a) $2n\pi + \frac{\pi}{6}$ (b) $n\pi + \frac{\pi}{3}$
 (c) $n\pi + \frac{\pi}{6}$ (d) $n\pi + \frac{\pi}{4}$

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

$$\text{Ans. (c) : } \sqrt{\frac{1 - \cos 2\theta}{1 + \cos 2\theta}} = \frac{1}{\sqrt{3}}$$

On squaring both sides-

$$\begin{aligned} \frac{1 - \cos 2\theta}{1 + \cos 2\theta} &= \frac{1}{3} \\ \frac{1 - (1 - 2\sin^2 \theta)}{1 + 2\cos^2 \theta - 1} &= \frac{1}{3} \end{aligned}$$

$$\Rightarrow \frac{\sin^2 \theta}{\cos^2 \theta} = \frac{1}{3}$$

$$\Rightarrow \tan^2 \theta = \frac{1}{3}$$

$$\Rightarrow \tan \theta = \frac{1}{\sqrt{3}} = \tan 30^\circ$$

$$\therefore \text{Value of } \theta = n\pi + \frac{\pi}{6}$$

33. If θ is an acute angle and $\sin \theta = \cos \theta$, then $2\cot^2 \theta + \sin^2 \theta - 1 = ?$

- (a) 0 (b) $\frac{3}{2}$
 (c) -1 (d) 1

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (b) : Given-

$$\sin \theta = \cos \theta \quad (\text{If } \theta = 45^\circ \text{ then } \sin \theta = \cos \theta)$$

On putting the value of $\theta = 45^\circ$

$$\begin{aligned} 2\cot^2 45^\circ + \sin^2 45^\circ - 1 &= 2 \times 1 + \left(\frac{1}{\sqrt{2}}\right)^2 - 1 \\ &= 2 + \frac{1}{2} - 1 \\ &= \frac{4 + 1 - 2}{2} \\ &= \frac{5 - 2}{2} \\ &= \frac{3}{2} \end{aligned}$$

34. $\sin 25^\circ \cos 35^\circ + \cos 25^\circ \sin 35^\circ = ?$

- (a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{\sqrt{2}}$
(c) 1 (d) $\frac{1}{2}$

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (a) $\therefore \sin A \cos B + \cos A \sin B = \sin(A + B)$
 $\sin 25^\circ \cos 35^\circ + \cos 25^\circ \sin 35^\circ = \sin(25^\circ + 35^\circ)$
 $= \sin 60^\circ$
 $= \frac{\sqrt{3}}{2}$

35. Find the value of $\cos 37^\circ \sec 143^\circ + \sin 34^\circ \operatorname{cosec} 146^\circ$

- (a) -1 (b) 1
(c) $\frac{1}{2}$ (d) 0

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) $\cos 37^\circ \sec 143^\circ + \sin 34^\circ \operatorname{cosec} 146^\circ$
 $\frac{\cos 37^\circ}{\cos 143^\circ} + \frac{\sin 34^\circ}{\sin 146^\circ} = \frac{\cos 37^\circ}{\cos(180^\circ - 37^\circ)} + \frac{\sin 34^\circ}{\sin(180^\circ - 34^\circ)}$
 $= \frac{\cos 37^\circ}{-\cos 37^\circ} + \frac{\sin 34^\circ}{\sin 34^\circ} = -1 + 1 = 0$

36. Find the value of the following.

$\frac{\cos 15^\circ - \sin 75^\circ}{\cos 15^\circ + \sin 75^\circ}$

- (a) ∞ (b) 1
(c) $2 \cos 15^\circ$ (d) 0

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) $\frac{\cos 15^\circ - \sin 75^\circ}{\cos 15^\circ + \sin 75^\circ}$
 $= \frac{\cos(90^\circ - 75^\circ) - \sin 75^\circ}{\cos 15^\circ + \sin 75^\circ}$
 $= \frac{\sin 75^\circ - \sin 75^\circ}{\cos 15^\circ + \sin 75^\circ} \quad \{\because \cos(90^\circ - \theta) = \sin \theta\}$
 $= \frac{0}{\cos 15^\circ + \sin 75^\circ}$
 $= 0$

37. Find the value of

$\frac{\sin 27^\circ \cdot \cos 63^\circ}{\cos^2 27^\circ} - \frac{\sec 27^\circ \cdot \operatorname{cosec} 63^\circ}{\tan^2 45^\circ}$

- (a) -1 (b) 0
(c) 1 (d) 2

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (a) $\frac{\sin 27^\circ \cdot \cos 63^\circ}{\cos^2 27^\circ} - \frac{\sec 27^\circ \cdot \operatorname{cosec} 63^\circ}{\tan^2 45^\circ}$
 $= \frac{\sin 27^\circ \cdot \cos(90^\circ - 27^\circ)}{\cos^2 27^\circ} - \frac{\sec 27^\circ \cdot \operatorname{cosec}(90^\circ - 27^\circ)}{\tan^2 45^\circ}$

$\left. \begin{aligned} \because \tan 45^\circ &= 1 \\ \cos(90^\circ - \theta) &= \sin \theta \\ \operatorname{cosec}(90^\circ - \theta) &= \sec \theta \end{aligned} \right\}$

$= \frac{\sin^2 27^\circ}{\cos^2 27^\circ} - \frac{\sec^2 27^\circ}{1}$
 $= \tan^2 27^\circ - \sec^2 27^\circ$
 $= (-\sec^2 27^\circ + \tan^2 27^\circ)$
 $= -(\sec^2 27^\circ - \tan^2 27^\circ) \quad \{\because \sec^2 \theta - \tan^2 \theta = 1\}$
 $= -1$

38. If $\theta = 30^\circ$, then what will be the value of $\sin \theta \cos \theta$?

- (a) $\frac{\sqrt{3}}{6}$ (b) $\frac{\sqrt{3}}{4}$
(c) $\frac{\sqrt{3}}{2}$ (d) $\frac{3}{8}$

RRB NTPC 17.02.2021 (Shift-II) Stage I

Ans. (b) $\theta = 30^\circ$
 $\sin \theta \cos \theta$
 $= \sin 30^\circ \cos 30^\circ$
 $= \frac{1}{2} \times \frac{\sqrt{3}}{2}$
 $= \frac{\sqrt{3}}{4}$

39. If $\cos 2\theta = \frac{1}{2}$, the the value of $\sin(75^\circ - \theta)$ will be:

- (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$
(c) $\sqrt{2} - 1$ (d) $\sqrt{2} + 1$

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (b)

$\cos 2\theta = \frac{1}{2} = \cos 60^\circ$
 $2\theta = 60^\circ$
 $\theta = 30^\circ$
 $\therefore \sin(75^\circ - \theta) = \sin(75^\circ - 30^\circ) = \sin 45^\circ = \frac{1}{\sqrt{2}}$

40. If $\sin(A - B) = \frac{1}{2}$ and $\cos(A + B) = \frac{1}{2}$ with

$0^\circ < (A + B) \leq 90^\circ, A > B$ then find the measure of A and B.

- (a) $35^\circ, 15^\circ$ (b) $40^\circ, 35^\circ$
(c) $25^\circ, 20^\circ$ (d) $45^\circ, 15^\circ$

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (d) :

$$\sin(A - B) = \frac{1}{2} \quad \cos(A + B) = \frac{1}{2}$$

$$\sin(A - B) = \sin 30^\circ \quad \cos(A + B) = \cos 60^\circ$$

$$A - B = 30^\circ \text{ --- (i)} \quad A + B = 60^\circ \text{ --- (ii)}$$

On adding equation (i) and equation (ii)

$$\begin{aligned} A - B &= 30^\circ \\ A + B &= 60^\circ \\ \hline 2A &= 90^\circ \\ A &= 45^\circ \end{aligned}$$

On putting the value of A in equation (i)

$$\begin{aligned} A - B &= 30^\circ \\ 45^\circ - B &= 30^\circ \\ 45^\circ - 30^\circ &= B \end{aligned}$$

$$\boxed{B = 15^\circ}$$

41. If $\tan 2\theta = \cot(\theta + 6^\circ)$ then find out the value of θ :

- (a) 24° (b) 12°
(c) 45° (d) 28°

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (d) : $\tan 2\theta = \cot(\theta + 6^\circ)$

$$\tan 2\theta = \tan [90^\circ - (\theta + 6^\circ)]$$

$$2\theta = 90^\circ - \theta - 6^\circ$$

$$3\theta = 84^\circ$$

$$\Rightarrow \theta = 28^\circ$$

42. If $\theta = 45^\circ$, then what will be the value of $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$?

- (a) 0 (b) -1
(c) 1 (d) ∞

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given,

$$\theta = 45^\circ$$

$$= \frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$$

$$= \frac{\sin 45^\circ + \cos 45^\circ}{\sin 45^\circ - \cos 45^\circ}$$

$$= \frac{\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}}$$

$$= \frac{2}{\sqrt{2}} / 0$$

$$= \infty \quad \dots \left(\because \frac{1}{0} = \infty \right)$$

43. The value of $\cos 75^\circ + \sin 15^\circ$ is equal to:

- (a) $\frac{\sqrt{2}}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{\sqrt{2}}$
(c) $\frac{\sqrt{3}+1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}-1}{\sqrt{2}}$

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : $\cos 75^\circ + \sin 15^\circ$

$$= \cos(90^\circ - 15^\circ) + \sin 15^\circ \quad \{ \because \cos(90^\circ - \theta) = \sin \theta \}$$

$$= \sin 15^\circ + \sin 15^\circ$$

$$= 2\sin 15^\circ \quad \left(\text{From } \sin 15^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}} \right)$$

$$= 2 \times \frac{\sqrt{3}-1}{2\sqrt{2}}$$

$$= \frac{\sqrt{3}-1}{\sqrt{2}}$$

44. If $\sin 2A = \cos 75^\circ$, then the smallest positive value of A is:

- (a) 15° (b) 7.5°
(c) 30° (d) 75°

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (b) : $\sin 2A = \cos 75^\circ$

$$\cos(90^\circ - 2A) = \cos 75^\circ \quad \{ \because \sin A = \cos(90^\circ - A) \}$$

$$90^\circ - 2A = 75^\circ$$

$$2A = 90^\circ - 75^\circ$$

$$2A = 15^\circ$$

$$A = \frac{15^\circ}{2}$$

$$A = 7.5^\circ$$

45. The value of $\cos 12^\circ + \cos 84^\circ + \cos 168^\circ + \cos 96^\circ$ is:

- (a) -1 (b) 0
(c) 1 (d) 0.5

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (b) : $\cos 12^\circ + \cos 84^\circ + \cos 168^\circ + \cos 96^\circ$

$$= \cos 12^\circ + \cos 84^\circ + \cos(180^\circ - 12^\circ) + \cos(180^\circ - 84^\circ)$$

$$= \cos 12^\circ + \cos 84^\circ - \cos 12^\circ - \cos 84^\circ$$

$$= 0$$

46. If $\sin(A + B) = \frac{\sqrt{3}}{2}$ and $\cos(A - B) = \frac{\sqrt{3}}{2}$, then which of the following will be possible values of A and B?

- (a) $A = 45^\circ, B = 15^\circ$ (b) $A = 50^\circ, B = 10^\circ$
(c) $A = 45^\circ, B = 30^\circ$ (d) $A = 10^\circ, B = 45^\circ$

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

$$\sin(A + B) = \frac{\sqrt{3}}{2}$$

$$\sin(A + B) = \sin 60^\circ$$

$$A + B = 60^\circ \text{(i)}$$

and $\cos(A - B) = \frac{\sqrt{3}}{2}$

$$\cos(A - B) = \cos 30^\circ$$

$$A - B = 30^\circ \text{(ii)}$$

On adding equation (i) and (ii),

$$2A = 90^\circ$$

$$A = 45^\circ$$

On putting the value of A in equation (i)

$$45^\circ + B = 60^\circ$$

$$B = 15^\circ$$

Hence, $A = 45^\circ, B = 15^\circ$

47. $\cos(x-y) = \frac{\sqrt{3}}{2}$ and $\sin(x+y) = 1$, where x and y are positive acute angles and $x \geq y$, then x and y are:
- (a) $50^\circ, 40^\circ$ (b) $70^\circ, 20^\circ$
(c) $60^\circ, 30^\circ$ (d) $80^\circ, 10^\circ$

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (c) : $\cos(x-y) = \frac{\sqrt{3}}{2}$
 $(x-y) = 30^\circ$ (i)
 $\sin(x+y) = 1$
 $x+y = 90^\circ$ (ii)
 From equation (i) and equation (ii),
 $x-y = 30^\circ$
 $x+y = 90^\circ$
 $\hline 2x = 120^\circ$
 $x = 60^\circ$
 On putting the value of x in equation (i)
 $60^\circ - y = 30^\circ$
 $y = 30^\circ$
 Hence, $x = 60^\circ, y = 30^\circ$

48. Find the value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 80^\circ + \sin^2 85^\circ$.
- (a) 0 (b) 1
(c) 2 (d) 3

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (c) :
 $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 80^\circ + \sin^2 85^\circ$
 $= \sin^2 5^\circ + \sin^2 10^\circ + \sin^2 (90^\circ - 10^\circ) + \sin^2 (90^\circ - 5^\circ)$
 $= \sin^2 5^\circ + \sin^2 10^\circ + \cos^2 10^\circ + \cos^2 5^\circ$
 $= (\sin^2 5^\circ + \cos^2 5^\circ) + \sin^2 10^\circ + \cos^2 10^\circ$
 $= 1 + 1$ [$\because \sin^2 \theta + \cos^2 \theta = 1$]
 $= 2$

49. If $\tan \theta = 1$ (θ is an acute angle) then the value of $2\sin \theta \cos \theta - \operatorname{cosec}^2 \theta$ is:
- (a) $1 - \sqrt{2}$ (b) 1
(c) -1 (d) -3

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : Given,
 $\tan \theta = 1$
 $\tan \theta = \tan 45^\circ$
 $\theta = 45^\circ$
 $2\sin \theta \cos \theta - \operatorname{cosec}^2 \theta = 2\sin 45^\circ \cos 45^\circ - \operatorname{cosec}^2 45^\circ$
 $= 2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} - (\sqrt{2})^2$
 $= 2 \times \frac{1}{2} - 2$
 $= 1 - 2$
 $= -1$

50. If $\sqrt{3} \sin \theta - \cos \theta = 0$ (θ is an acute angle), then the value of $\cos^3 \theta - \sqrt{3} \sin^3 \theta$ will be:

- (a) $\frac{\sqrt{3}}{2}$ (b) -1
(c) $\frac{3}{8}$ (d) $\frac{\sqrt{3}}{4}$

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given,
 $\sqrt{3} \sin \theta - \cos \theta = 0$
 $\sqrt{3} \sin \theta = \cos \theta$
 $\sqrt{3} = \frac{\cos \theta}{\sin \theta}$
 $\cot \theta = \sqrt{3}$
 $\theta = 30^\circ$
 $\cos^3 \theta - \sqrt{3} \sin^3 \theta = \cos^3 30^\circ - \sqrt{3} \sin^3 30^\circ$
 $= \left(\frac{\sqrt{3}}{2}\right)^3 - \sqrt{3} \left(\frac{1}{2}\right)^3$
 $= \frac{3\sqrt{3} - \sqrt{3}}{8}$
 $= \frac{\sqrt{3}}{4}$

51. Evaluate:

$$3 \tan 25^\circ \tan 35^\circ \tan 45^\circ \tan 55^\circ \tan 65^\circ$$

- (a) 0 (b) 3
(c) 4 (d) $3\sqrt{3}$

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (b) :
 $3 \tan 25^\circ \tan 35^\circ \tan 45^\circ \tan 55^\circ \tan 65^\circ$
 $= 3 \tan 25^\circ \tan 35^\circ \tan 45^\circ \tan (90^\circ - 35^\circ) \tan (90^\circ - 25^\circ)$
 $= 3 \tan 25^\circ \tan 35^\circ \tan 45^\circ \cot 35^\circ \cot 25^\circ$
 $= 3 \tan 45^\circ = 3 \times 1 = 3$

$$\left\{ \begin{array}{l} \because \tan(90^\circ - \theta) = \cot \theta \\ \tan \theta \cdot \cot \theta = 1 \\ \tan 45^\circ = 1 \end{array} \right\}$$

52. If $\sqrt{2} \sin(5x - 5^\circ) = \tan 45^\circ$, then the value of x (in degrees) is:
- (a) 16 (b) 12
(c) 14 (d) 10

RRB NTPC 09.02.2021 (Shift-II) Stage I

Ans. (d) : $\sqrt{2} \sin(5x - 5^\circ) = \tan 45^\circ$
 $\sqrt{2} \sin(5x - 5^\circ) = 1$
 $\sin(5x - 5^\circ) = \frac{1}{\sqrt{2}}$
 $\sin(5x - 5^\circ) = \sin 45^\circ$
 $5x - 5^\circ = 45^\circ$
 $5x = 50^\circ$
 $x = 10^\circ$

53. Find the value of $\tan 1^\circ \cdot \tan 2^\circ \cdot \tan 3^\circ \dots \dots \dots \tan 89^\circ$

- (a) $\sqrt{3}$ (b) 0
(c) 1 (d) $\frac{1}{\sqrt{3}}$

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (c) :

$$\begin{aligned} & \tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \dots \dots \tan 87^\circ \tan 88^\circ \tan 89^\circ \\ & (\because \tan(90^\circ - \theta) = \cot \theta) \\ & \tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \dots \dots \cot 3^\circ \cot 2^\circ \cot 1^\circ \\ & = 1 \quad (\because \tan \theta \cdot \cot \theta = 1) \end{aligned}$$

54. What is the value of the following expression?
 $(\tan 2^\circ \tan 88^\circ) (\tan 3^\circ \tan 87^\circ) \dots (\tan 43^\circ \tan 47^\circ) \tan 45^\circ$

- (a) 0 (b) 1
(c) -1 (d) ∞

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) : From the question,

$$\begin{aligned} & (\tan 2^\circ \tan 88^\circ) (\tan 3^\circ \tan 87^\circ) \dots (\tan 43^\circ \tan 47^\circ) \tan 45^\circ \\ & = \tan 2^\circ \cdot \tan(90^\circ - 2^\circ) \cdot \tan 3^\circ \cdot \tan(90^\circ - 3^\circ) \dots \tan 43^\circ \cdot \tan(90^\circ - 43^\circ) \cdot \tan 45^\circ \\ & = (\tan 2^\circ \cdot \cot 2^\circ) (\tan 3^\circ \cdot \cot 3^\circ) \dots (\tan 43^\circ \cdot \cot 43^\circ) \cdot \tan 45^\circ \\ & = 1 \times 1 \dots \dots 1 \times 1 \quad [\tan \theta \cdot \cot \theta = 1] \\ & = 1 \end{aligned}$$

55. Find the value of $\cos^2(270^\circ - \phi) - \sin^2(180^\circ - \phi) + \sin^2\left(\frac{\pi}{2}\right) \sin^2(270^\circ - \phi)$
- (a) $\sin^2(\phi)$ (b) $\cos^2(\phi)$
(c) $\sin^2\left(\frac{\pi}{2}\right)$ (d) $\sin^2(\phi) - 1$

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\begin{aligned} & \cos^2(270^\circ - \phi) - \sin^2(180^\circ - \phi) + \sin^2\left(\frac{\pi}{2}\right) \sin^2(270^\circ - \phi) \\ & \left\{ \begin{array}{l} \because \cos(270^\circ - \theta) = -\sin \theta \\ \sin(180^\circ - \theta) = \sin \theta \\ \sin(270^\circ - \theta) = -\cos \theta \end{array} \right\} \\ & (-\sin \phi)^2 - \sin^2 \phi + 1 \cdot (-\cos \phi)^2 \\ & = \sin^2 \phi - \sin^2 \phi + \cos^2 \phi \\ & = \cos^2 \phi \end{aligned}$$

56. Value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \dots \dots \cos 179^\circ$ is :

- (a) 0 (b) -1
(c) 1 (d) $\frac{1}{2}$

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (a) : $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \dots \dots \cos 179^\circ$
 $= 0 \quad \{ \because \cos 90^\circ = 0 \}$

57. Find the value of the expression

$$[\operatorname{cosec}(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)].$$

- (a) 1 (b) 0
(c) -1 (d) $\frac{3}{2}$

RRB NTPC 18.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\begin{aligned} & [\operatorname{cosec}(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)] \\ & = \operatorname{cosec}\{90^\circ - (15^\circ - \theta)\} - \sec(15^\circ - \theta) - \tan\{90^\circ - (35^\circ - \theta)\} + \cot(35^\circ - \theta) \\ & = \sec(15^\circ - \theta) - \sec(15^\circ - \theta) - \cot(35^\circ - \theta) + \cot(35^\circ - \theta) \\ & = 0 \end{aligned}$$

58. If

$$6(\sec^2 59^\circ - \cot^2 31^\circ) + \frac{2}{3} \sin 90^\circ - 3 \tan^2 56^\circ y \tan^2 34^\circ = \frac{y}{3}$$

then the value of y is:

- (a) 3 (b) 1
(c) 4 (d) 2

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (d) : $6(\sec^2 59^\circ - \cot^2 31^\circ) +$

$$\frac{2}{3} \sin 90^\circ - 3 \tan^2 56^\circ y \tan^2 34^\circ = \frac{y}{3}$$

$$6(\sec^2 59^\circ - \tan^2 59^\circ) + \frac{2}{3} \times 1 - 3 \tan^2 56^\circ y \cot^2 56^\circ = \frac{y}{3}$$

$$\left\{ \begin{array}{l} \because \tan(90^\circ - \theta) = \cot \theta \\ \sec^2 \theta - \tan^2 \theta = 1 \end{array} \right\}$$

$$6 \times 1 + \frac{2}{3} - 3y = \frac{y}{3}$$

$$\frac{20}{3} = \frac{10y}{3}$$

$$y = 2$$

59. The value of $5 \sin 14^\circ \sec 76^\circ + 3 \cot 15^\circ \cot 75^\circ + 2 \tan 45^\circ$ is :

- (a) 0 (b) 10
(c) 1 (d) 8

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : $5 \sin 14^\circ \sec 76^\circ + 3 \cot 15^\circ \cot 75^\circ + 2 \tan 45^\circ$
 $= 5 \sin 14^\circ \sec(90^\circ - 14^\circ) + 3 \cot(90^\circ - 75^\circ) \cot 75^\circ + 2 \tan 45^\circ$

$$\left\{ \begin{array}{l} \because \sin(90^\circ - \theta) = \cos \theta \\ \cos(90^\circ - \theta) = \sin \theta \end{array} \right\}$$

$$\begin{aligned} & = 5 \sin 14^\circ \operatorname{cosec} 14^\circ + 3 \tan 75^\circ \cot 75^\circ + 2 \tan 45^\circ \\ & = 5 \times 1 + 3 \times 1 + 2 \times 1 = 5 + 3 + 2 = 10 \end{aligned}$$

60. If $\sqrt{3} \tan \theta = 1$ find the value of $\cos 2\theta$.

- (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{3}}$
(c) $\frac{1}{3}$ (d) 1

RRB NTPC 12.04.2016 Shift : 1

Ans : (a) From the question,

$$\begin{aligned}\sqrt{3} \tan \theta &= 1 \\ \Rightarrow \tan \theta &= \frac{1}{\sqrt{3}} = \tan 30^\circ \\ \therefore \theta &= 30^\circ \\ \therefore \cos 2\theta &= \cos 2 \times 30^\circ \\ &= \cos 60^\circ = \frac{1}{2}\end{aligned}$$

61. What is the value of the following expression ($\tan 0^\circ \tan 1^\circ \tan 2^\circ \tan 3^\circ \tan 4^\circ \dots \tan 89^\circ$)

- (a) 0 (b) 1
(c) 2 (d) $1/2$

RRB NTPC 28.04.2016 Shift : 2

Ans : (a) $\because \tan 0^\circ = 0$

$$\therefore \tan 0^\circ \tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \tan 89^\circ = 0$$

62. If $2\cos\theta = \sqrt{3}$, then $\cos\theta \times \tan\theta = ?$

- (a) 1 (b) $\sqrt{3}/3$
(c) $\sqrt{3}/2$ (d) $1/2$

RRB NTPC 06.04.2016 Shift : 2

Ans : (d) Given,

$$\begin{aligned}2\cos\theta &= \sqrt{3} \\ \cos\theta &= \frac{\sqrt{3}}{2} \\ \cos\theta &= \cos 30^\circ \\ \theta &= 30^\circ \\ \cos\theta \times \tan\theta &= \cos 30^\circ \times \tan 30^\circ = \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{3}} = \frac{1}{2}\end{aligned}$$

63. If $A + B = 90^\circ$ and $\cos B = \frac{1}{3}$, then the value of $\sin A$.

- (a) $1/2$ (b) $1/4$
(c) $1/3$ (d) $2/3$

RRB NTPC 27.04.2016 Shift : 1

Ans : (c) $A + B = 90^\circ$

$$B = 90^\circ - A \quad \dots(i)$$

$$\therefore \cos B = \frac{1}{3}$$

$$\cos(90^\circ - A) = \frac{1}{3} \quad [\text{From equation (i)}]$$

$$\sin A = \frac{1}{3}$$

64. If $\sin\theta - \cos\theta = 0$, (angle in first quadrant) then the value of $\sin^3\theta + 3\cos^3\theta$ is:

- (a) $\frac{1}{\sqrt{2}}$ (b) 2
(c) $\sqrt{2}$ (d) $2\sqrt{2}$

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$\begin{aligned}\sin\theta - \cos\theta &= 0 \\ \sin\theta &= \cos\theta \\ \frac{\sin\theta}{\cos\theta} &= 1 \\ \tan\theta &= 1, \quad \theta = 45^\circ \\ \sin^3\theta + 3\cos^3\theta &\quad (\text{Putting } \theta = 45^\circ) \\ &= \sin^3 45^\circ + 3\cos^3 45^\circ \\ &= \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + 3 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} \\ &= \frac{1}{2\sqrt{2}} + \frac{3}{2\sqrt{2}} \\ &= \frac{1+3}{2\sqrt{2}} \\ &= \frac{4}{2\sqrt{2}} \\ &= \frac{2}{\sqrt{2}} \\ &= \frac{\sqrt{2} \times \sqrt{2}}{\sqrt{2}} \\ &= \sqrt{2}\end{aligned}$$

65. The least value of $2\sin^2\theta + 3\cos^2\theta$ is :

- (a) 3 (b) 1
(c) 5 (d) 2

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (d) : $2\sin^2\theta + 3\cos^2\theta$

$$\Rightarrow 2\sin^2\theta + 3(1 - \sin^2\theta)$$

$$\Rightarrow 2\sin^2\theta + 3 - 3\sin^2\theta$$

$$\Rightarrow 3 - \sin^2\theta$$

For the minimum value $3 - \sin^2\theta$ the value of $\sin^2\theta$ will be maximum then put $\sin^2\theta = 1$

$$\Rightarrow 3 - 1 \Rightarrow \boxed{2}$$

Type - 3

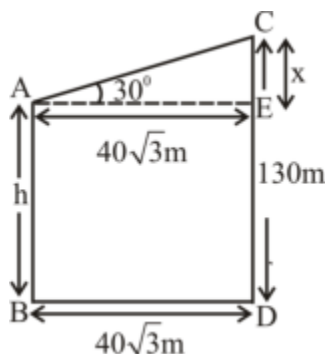
Problems Based on Height and Distance

66. The horizontal distance between two towers is $40\sqrt{3}$ m. The angle of depression of the top of the first tower when seen from the top of the second tower is 30° . If the height of the second tower is 130 m, find the height of the first tower.

- (a) 85 m (b) 90 m
(c) 80 m (d) 95 m

RRB NTPC 30.12.2020 (Shift-II) Stage Ist

Ans. (b) :



In $\triangle ACE$,

$$\tan 30^\circ = \frac{x}{AE}$$

$$\tan 30^\circ = \frac{x}{40\sqrt{3}}$$

$$x = 40\sqrt{3} \times \frac{1}{\sqrt{3}}$$

$$x = 40\text{m}$$

Hence $h = (130 - x)\text{m}$

$$= (130 - 40)$$

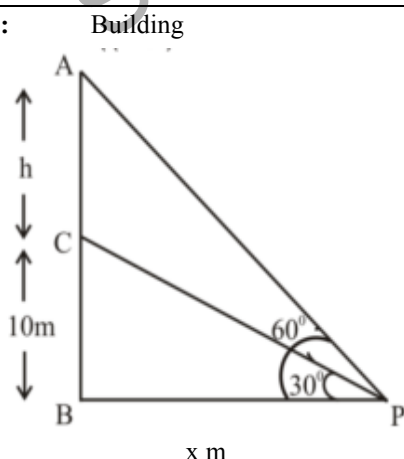
$$h = 90\text{m}$$

67. A window in a building is at a height of 10 meters from the ground. The angle of depression of a point P on the ground from the window is 30° . The angle of elevation of the top of the building from the point P is 60° . What is the height of the building?

- (a) 30 meters (b) 35 meters
(c) 40 meters (d) 20 meters

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (a) :



In $\triangle BPC$,

$$\tan 30^\circ = \frac{BC}{BP} = \frac{10}{x}$$

$$\frac{1}{\sqrt{3}} = \frac{10}{x}$$

$$x = 10\sqrt{3} \quad \dots (1)$$

In $\triangle ABP$,

$$\tan 60^\circ = \frac{AB}{BP}$$

$$\sqrt{3} = \frac{h+10}{x}$$

$$h+10 = \sqrt{3}x$$

$$h+10 = \sqrt{3} \times 10\sqrt{3} \quad (\text{From equation 1})$$

$$h+10 = 30$$

$$h = 20$$

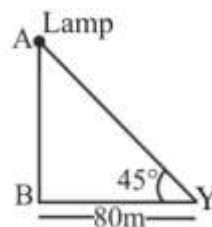
Hence height of the building $= h + 10 = 20 + 10 = 30\text{ m}$

68. From a point Y on a level ground, the angle of elevation of the top of a lamp post is 45° . If the distance of point Y from the foot of the lamp post is 80 m, the height of the lamp post will be:

- (a) 82 m (b) 70 m
(c) 80 m (d) 78 m

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (c)



Hence

$$\tan 45^\circ = \frac{AB}{BY}$$

AB = Height of lamp post and BY base.

$$\tan 45^\circ = \frac{AB}{80}$$

$$1 = \frac{AB}{80}$$

$$AB = 80\text{ m}$$

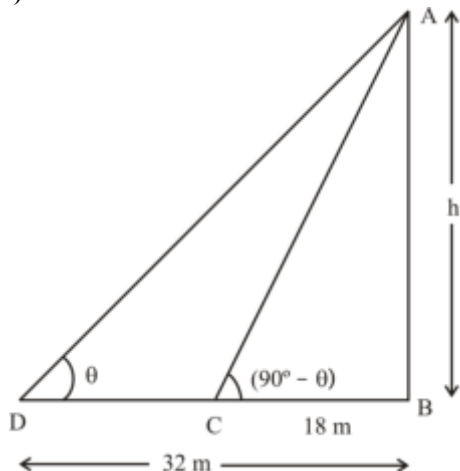
Hence, the height of the lamp post will be 80m.

69. The angles of elevation of the top of a tower from two points on the ground 18 m and 32 m away from the foot of the tower are complementary. The height of the tower is:

- (a) 32m (b) 36m
(c) 20m (d) 24m

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (d) :



Let $AB = h$ be a tower of height whose distance from base B to points C and D are 18m and 32m respectively.

Let, $\angle ADB = \theta$

then $\angle ACB = 90^\circ - \theta$

Now in right angled triangle $\triangle ABC$

$$\tan(90^\circ - \theta) = \frac{AB}{BC}$$

$$\cot \theta = \frac{h}{18} \quad \dots (1)$$

Similarly, in $\triangle ABD$,

$$\tan \theta = \frac{h}{32} \quad \dots (2)$$

On multiplying equation (1) and (2),

$$\cot \theta \times \tan \theta = \frac{h}{18} \times \frac{h}{32}$$

$$1 = \frac{h^2}{576}$$

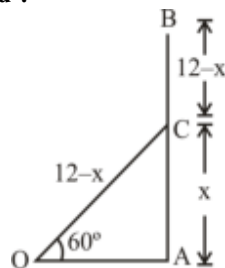
$$h^2 = 576$$

$$h = \sqrt{576}$$

$$h = 24 \text{ m}$$

Hence height of the tower = 24 m .

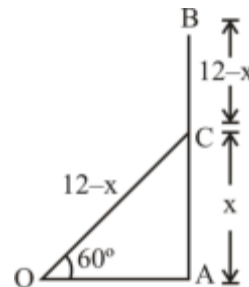
70. A tree, 12 m height, is broken by the wind in such a way that its top touches the ground and makes an angle of 60° with the ground. At what height from the bottom of earth tree broken by the wind ?



- (a) $(2\sqrt{3} - 3)\text{m}$ (b) $24\sqrt{3}\text{m}$
(c) $(24\sqrt{3} - 36)\text{m}$ (d) $(24\sqrt{2} - 30)\text{m}$

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) :



$$\sin \theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$$

$$\sin 60^\circ = \frac{x}{12-x}$$

$$\frac{\sqrt{3}}{2} = \frac{x}{12-x}$$

$$2x = 12\sqrt{3} - \sqrt{3}x$$

$$x(\sqrt{3} + 2) = 12\sqrt{3}$$

$$x = \frac{12\sqrt{3}}{2 + \sqrt{3}} \times \frac{2 - \sqrt{3}}{2 - \sqrt{3}}$$

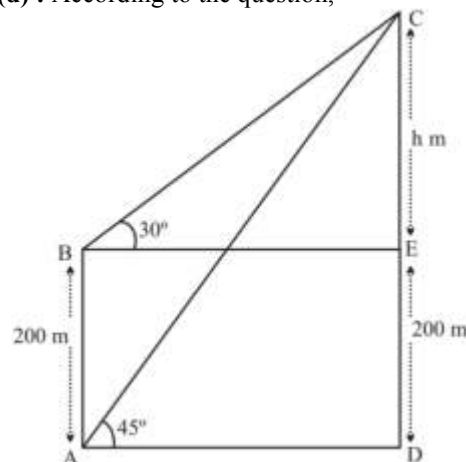
$$x = (24\sqrt{3} - 36)\text{m}$$

71. From the top and the bottom of 200 m high building, the angles of elevation of the top of a tower are 30° and 45° respectively. What is the height (in m) of the tower?

- (a) $100\sqrt{3}(\sqrt{3} - 1)$ (b) $300(\sqrt{3} + 1)$
(c) $100(\sqrt{3} + 1)$ (d) $100\sqrt{3}(\sqrt{3} + 1)$

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,



From $\triangle ACD$,

$$\tan 45^\circ = \frac{h + 200}{AD} \quad [\tan 45^\circ = 1]$$

$$AD = h + 200 \quad \dots (i)$$

From $\triangle BCE$,

$$\tan 30^\circ = \frac{h}{BE}$$

$$\tan 30^\circ = \frac{h}{h+200} \quad \{\because AD = BE = h + 200\}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{h+200}$$

$$h+200 = \sqrt{3}h$$

$$200 = h(\sqrt{3}-1)$$

$$h = \frac{200}{\sqrt{3}-1}$$

$$h = \frac{200}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$= \frac{200(\sqrt{3}+1)}{2}$$

$$h = 100(\sqrt{3}+1)$$

$$\text{Hence height of the tower} = 100(\sqrt{3}+1) + 200$$

$$= 100\sqrt{3} + 300$$

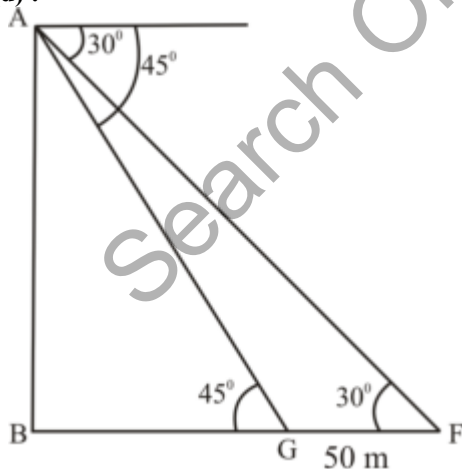
$$= 100\sqrt{3}(1+\sqrt{3}) \text{ m}$$

72. The angles of depression of two houses of the same height from the top of a building are 45° and 30° towards the east. If the two houses are 50 m apart, what will be the height of the building in metres?

- (a) $50(\sqrt{3}+1)$ (b) $45(\sqrt{3}-1)$
(c) $35(\sqrt{3}-1)$ (d) $25(\sqrt{3}+1)$

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (d) :



In $\triangle ABG$,

$$\tan 45^\circ = \frac{AB}{BG}$$

$$1 = \frac{AB}{BG}$$

$$BG = AB$$

In $\triangle ABF$,

$$\tan 30^\circ = \frac{AB}{BG+GF}$$

$$\frac{1}{\sqrt{3}} = \frac{AB}{AB+50}$$

$$AB+50 = \sqrt{3}AB$$

$$AB = \frac{50}{\sqrt{3}-1} \text{ m}$$

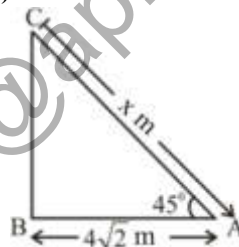
$$\frac{50}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{50(\sqrt{3}+1)}{(\sqrt{3})^2 - (1)^2} = \frac{50(\sqrt{3}+1)}{2} = 25(\sqrt{3}+1)$$

73. The angle of elevation of a ladder leaning against a wall is 45° . The foot of the ladder is $4\sqrt{2}$ metres away from wall. The length of the ladder is:

- (a) 7 m (b) 8 m
(c) 5 m (d) 6 m

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (b) :



Let the length of ladder be x meters.

$$AB = 4\sqrt{2} \text{ m}$$

$$\text{and } \angle BAC = 45^\circ$$

$$\tan 45^\circ = \frac{BC}{AB} = \frac{BC}{4\sqrt{2}}$$

$$1 = \frac{BC}{4\sqrt{2}}$$

$$\Rightarrow BC = 4\sqrt{2}$$

From Pythagoras theorem,

$$AC^2 = BC^2 + AB^2$$

$$x^2 = (4\sqrt{2})^2 + (4\sqrt{2})^2$$

$$x^2 = 32 + 32$$

$$x^2 = 64$$

$$x = \sqrt{64}$$

$$x = 8 \text{ m}$$

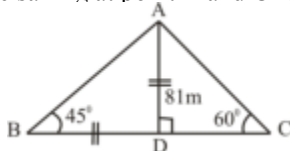
Hence the length of ladder is 8m.

74. Two ships are sailing in the sea on the two sides of a light house. The angles of elevation of the top of the lighthouse as observed from the ships are 45° and 60° respectively. If the lighthouse is 81 m height, then the distance between two ships:

- (a) $\frac{81}{\sqrt{3}}$ m (b) $\frac{[81(1+\sqrt{3})]}{\sqrt{3}}$ m
 (c) $\frac{(1+\sqrt{3})}{\sqrt{3}}$ m (d) $\frac{(1+\sqrt{3})}{81\sqrt{3}}$ m

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let the height of light house be AD and the ships are sailing at point B and C respectively.



In $\triangle ABD$,

$$\tan 45^\circ = \frac{81}{BD}$$

$$1 = \frac{81}{BD}$$

$$BD = 81\text{m}$$

In $\triangle ADC$,

$$\tan 60^\circ = \frac{81}{DC}$$

$$DC = \frac{81}{\sqrt{3}}\text{m}$$

Hence distance between both the ships

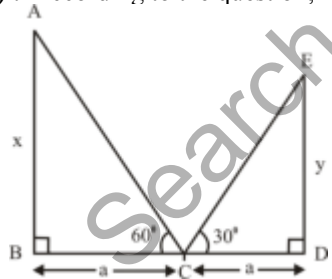
$$(BC) = BD + DC = 81 + \frac{81}{\sqrt{3}} = \frac{81(\sqrt{3}+1)}{\sqrt{3}}\text{ m}$$

75. The top of two towers of heights x and y standing on level ground, subtend angles of 60° and 30° respectively at the midpoint of the line joining their feet. The value of x : y is

- (a) 3 : 1 (b) 2 : 1 (c) 1 : 3 (d) 1 : 2

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,



In $\triangle ABC$,

$$\tan 60^\circ = \frac{x}{a} \Rightarrow \sqrt{3} = \frac{x}{a}$$

$$x = a\sqrt{3}$$

In $\triangle EDC$

$$\tan 30^\circ = \frac{y}{a} \Rightarrow \frac{1}{\sqrt{3}} = \frac{y}{a}$$

$$y = \frac{a}{\sqrt{3}}$$

$$x : y = a\sqrt{3} : \frac{a}{\sqrt{3}}$$

$$x : y = 3 : 1$$

76. An observer 1.5 m tall is standing 28.5 m away at the same level as the foot of a tower. If angle of elevation of the observer watching the top of the tower is 45 degrees then what is the height of the tower?

- (a) 30 m (b) 25 m
(c) 20 m (d) 35 m

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (a) : From the question,

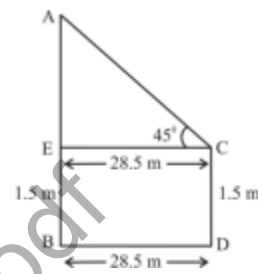
In $\triangle AEC$ -

$$\tan 45^\circ = \frac{AE}{EC} = \frac{AE}{28.5}$$

$$AE = 28.5\text{ m}$$

$$AB = AE + EB = 28.5 + 1.5$$

$$AB = 30\text{ m}$$



77. A 5 m long ladder is placed against a wall and reaches a height of 3 m on the wall. How far should ladder be taken towards the wall so that its end reaches a height of 4.8 m?

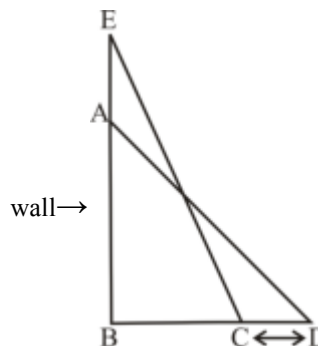
- (a) 2.96 m (b) 1.4 m
(c) 2.2 m (d) 2.6 m

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (d) : $AB = 3\text{ m}$

$$BE = 4.8\text{ m}$$

$$(\text{ladder}) AD = EC = 5\text{ m}$$



In $\triangle ABD$,

$$BD = \sqrt{(AD)^2 - (AB)^2}$$

$$BD = \sqrt{(5)^2 - (3)^2}$$

$$= \sqrt{25 - 9}$$

$$= \sqrt{16} = 4\text{ m}$$

In $\triangle EBC$,

$$BC = \sqrt{(EC)^2 - (EB)^2}$$

$$= \sqrt{(5)^2 - (4.8)^2}$$

$$= \sqrt{25 - 23.04} = \sqrt{1.96} = 1.4\text{ m}$$

$$CD = BD - BC$$

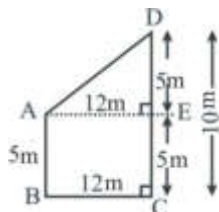
$$= 4 - 1.4 = 2.6\text{ m}$$

78. Two pillars of 5 meters and 10 meters stand straight on the ground. If the distance between their bottoms is 12 meters, find the distance between their vertices.

- (a) 11 meters (b) 12 meters
(c) 13 meters (d) 14 meters

RRB NTPC 04.04.2016 Shift : 3

Ans : (c)



Let the distance between the vertices of the pillars = AD m

$$AE = BC = 12 \text{ m}$$

$$DE = CD - CE = 10 - 5$$

$$DE = 5 \text{ m}$$

From Pythagoras theorem in $\triangle AED$,

$$AD^2 = AE^2 + DE^2 = (12)^2 + (5)^2 = 144 + 25$$

$$AD^2 = 169 \Rightarrow AD = 13 \text{ m}$$

79. The shadow of a tower of $25\sqrt{3}$ height increases by 50 meters when the angle of depression by the sun is 60° to x° . Find the measure of x .

- (a) 45° (b) 30°
(c) 75° (d) 90°

RRB NTPC 19.04.2016 Shift : 1

Ans : (b)

In $\triangle ABC$

$$\tan 60^\circ = \frac{25\sqrt{3}}{BC}$$

$$\sqrt{3} = \frac{25\sqrt{3}}{BC}$$

$$BC = 25 \dots\dots (1)$$

Again in $\triangle ABD$,

$$\tan x^\circ = \frac{25\sqrt{3}}{50 + BC}$$

$$\tan x^\circ = \frac{25\sqrt{3}}{50 + 25} = \frac{25\sqrt{3}}{75} = \frac{1}{\sqrt{3}}$$

$$\tan x^\circ = \tan 30^\circ$$

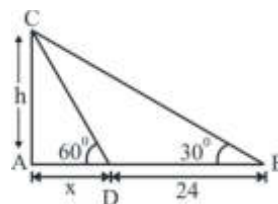
$$x^\circ = 30^\circ$$

80. The length of the shadow of a pillar decreases by 24 meters. When the angle of elevation of the sun increases from 30° to 60° , the length of the pillar is.

- (a) $10\sqrt{3}$ (b) $8\sqrt{3}$
(c) $16\sqrt{3}$ (d) $12\sqrt{3}$

RRB NTPC 18.04.2016 Shift : 2

Ans : (d)



In $\triangle ABC$,

$$\tan 30^\circ = \frac{h}{x + 24}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{x + 24}$$

$$\sqrt{3}h = x + 24 \dots\dots (I)$$

In $\triangle ADC$,

$$\tan 60^\circ = \frac{h}{x}$$

$$\sqrt{3} = \frac{h}{x}$$

$$h = \sqrt{3}x \dots\dots (II)$$

On putting the value of h in equation (I)

$$\sqrt{3} \times \sqrt{3}x = x + 24$$

$$3x = x + 24$$

$$2x = 24$$

$$x = 12$$

In $\triangle ADC$,

$$\tan 60^\circ = \frac{h}{12}$$

$$\sqrt{3} = \frac{h}{12}$$

$$h = 12\sqrt{3} \text{ m}$$

81. The angle of depression of two stones in the same direction from an aeroplane vertically above a straight road is 30° and 45° respectively. If the plane is flying at an altitude of 1.365 km, then what is the distance between the two stones?

- (a) 1 km (b) 2 km
(c) 3 km (d) 4 km

RRB NTPC 16.04.2016 Shift : 2

Ans : (a) \because From $\triangle DBC$

$$\tan 45^\circ = \frac{1.365}{DB}$$

$$DB = 1.365 \text{ km}$$

From $\triangle ABC$,

$$\tan 30^\circ = \frac{1.365}{AB}$$

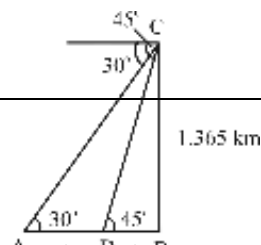
$$AB = 1.365\sqrt{3}$$

$$\therefore AD = AB - DB$$

$$AD = 1.365\sqrt{3} - 1.365 = 1.365(\sqrt{3} - 1)$$

$$= 1.365 \times 0.73 = 0.99 \approx 1 \text{ km}$$

So distance between the stones is 1 km.



Type - 4 Miscellaneous

82. If $x = 3\cos A \cos B$, $y = 3\cos A \sin B$ and $z = 3\sin A$, find the value of $x^2 + y^2 + z^2$

- (a) 9 (b) 6
(c) 12 (d) 3

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (a) : Given-

$$x = 3\cos A \cos B$$

$$y = 3\cos A \sin B$$

$$z = 3\sin A$$

$$\therefore x^2 + y^2 + z^2 = 9\cos^2 A \cos^2 B + 9\cos^2 A \sin^2 B + 9\sin^2 A$$

$$= 9\cos^2 A (\cos^2 B + \sin^2 B) + 9\sin^2 A$$

$$= 9\cos^2 A \times 1 + 9\sin^2 A \quad (\because \sin^2 \theta + \cos^2 \theta = 1)$$

$$= 9(\cos^2 A + \sin^2 A)$$

$$= 9 \times 1$$

$$= 9$$

83. If $x \cos 45^\circ \sin 120^\circ + \sin 60^\circ = -x \sin 90^\circ + 1$, then the value of x is:

- (a) $\frac{(2+\sqrt{3})}{\sqrt{2}+\sqrt{3}}$ (b) $\frac{(2-\sqrt{3})}{2\sqrt{2}+\sqrt{3}}$
(c) $\frac{(2-\sqrt{3})}{\sqrt{2}+\sqrt{3}}$ (d) $\frac{2\sqrt{2}-\sqrt{6}}{2\sqrt{2}+\sqrt{3}}$

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (d) : $x \cos 45^\circ \sin 120^\circ + \sin 60^\circ = -x \sin 90^\circ + 1$

$$x \times \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} = -x \times 1 + 1$$

$$\left(\frac{\sqrt{3}}{2\sqrt{2}} + 1\right)x = 1 - \frac{\sqrt{3}}{2}$$

$$\left(\frac{\sqrt{3}+2\sqrt{2}}{2\sqrt{2}}\right)x = \frac{2-\sqrt{3}}{2}$$

$$x = \frac{2\sqrt{2}-\sqrt{6}}{2\sqrt{2}+\sqrt{3}}$$

84. If $\sec \theta = 5x$ and $\tan \theta = \frac{5}{x}$, then the value of $10\left(x^2 - \frac{1}{x^2}\right)$ is

- (a) $\frac{3}{5}$ (b) $\frac{1}{5}$
(c) $\frac{2}{5}$ (d) 2

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (c) : $\sec \theta = 5x$... (i)

$$\tan \theta = 5/x \quad \dots (ii)$$

From equation (i) and equation (ii)-

$$\sec^2 \theta - \tan^2 \theta = 25\left(x^2 - \frac{1}{x^2}\right)$$

$$1 = 25\left(x^2 - \frac{1}{x^2}\right)$$

$$\left(x^2 - \frac{1}{x^2}\right) = \frac{1}{25}$$

$$10\left(x^2 - \frac{1}{x^2}\right) = \frac{10}{25}$$

$$10\left(x^2 - \frac{1}{x^2}\right) = \frac{2}{5}$$

85. If $x + \frac{1}{x} = 2 \cos \theta$, then what is the value of $x^2 + \frac{1}{x^2}$?

- (a) $\cos 2\theta$ (b) $\sin 2\theta$
(c) $2\cos 2\theta$ (d) $2\sin 2\theta$

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (c) : $x + \frac{1}{x} = 2 \cos \theta$

On squaring both sides,

$$\left(x + \frac{1}{x}\right)^2 = (2 \cos \theta)^2$$

$$x^2 + \frac{1}{x^2} + 2 = 4 \cos^2 \theta$$

$$x^2 + \frac{1}{x^2} = 4 \cos^2 \theta - 2$$

$$x^2 + \frac{1}{x^2} = 2(2 \cos^2 \theta - 1)$$

$$x^2 + \frac{1}{x^2} = 2 \cos 2\theta$$

86. If $x = r \sin A \cos C$, $y = r \sin A \sin C$ and $z = r \cos A$, then find the value of $x^2 + y^2 + z^2$

- (a) $2r^2$ (b) $2r$
(c) 0 (d) r^2

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (d) : Given-

$$x = r \sin A \cos C$$

$$y = r \sin A \sin C$$

$$z = r \cos A$$

$$x^2 + y^2 + z^2 = r^2 \sin^2 A \cos^2 C + r^2 \sin^2 A \sin^2 C + r^2 \cos^2 A$$

$$= r^2 [\sin^2 A (\cos^2 C + \sin^2 C) + \cos^2 A]$$

$$= r^2 [\sin^2 A + \cos^2 A]$$

$$\{\because \sin^2 \theta + \cos^2 \theta = 1\}$$

$$x^2 + y^2 + z^2 = r^2$$

87. If $x = a \sin \theta$, and $y = b \tan \theta$, then find the value

of $\frac{a^2}{x^2} - \frac{b^2}{y^2}$.

- (a) 2 (b) -1
(c) 0 (d) 1

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (d) : $x = a \sin \theta$, $y = b \tan \theta$

$$\frac{a}{x} = \frac{1}{\sin \theta}, \frac{b}{y} = \frac{1}{\tan \theta}$$

then,

$$\begin{aligned} \frac{a^2}{x^2} - \frac{b^2}{y^2} &= \frac{1}{\sin^2 \theta} - \frac{\cos^2 \theta}{\sin^2 \theta} \\ &= \frac{1 - \cos^2 \theta}{\sin^2 \theta} \quad (\because \sin^2 \theta + \cos^2 \theta = 1) \\ &= \frac{\sin^2 \theta}{\sin^2 \theta} \\ &= 1 \end{aligned}$$

88. Angle 54° is equivalent to (in radians):

- (a) $\frac{9\pi}{10}$ (b) $\frac{7\pi}{10}$
(c) $\frac{\pi}{10}$ (d) $\frac{3\pi}{10}$

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : From question,

$$\pi \text{ radian} = 180^\circ$$

$$1^\circ = \frac{\pi}{180} \text{ radian}$$

$$54^\circ = 54^\circ \times \frac{\pi}{180^\circ} = \frac{3\pi}{10}$$

89. In any triangle ABC, $a + b + c = 2s$ with usual notation, then the value of $\sin\left(\frac{A}{2}\right)$ is

- (a) $\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$ (b) $\sqrt{\frac{(s-c)(s-a)}{ac}}$
(c) $\sqrt{\frac{(s-b)(s-c)}{bc}}$ (d) $\sqrt{\frac{s(s-a)}{bc}}$

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given-

$$a + b + c = 2s \quad \dots(i)$$

$$\text{Area of triangle} = \frac{1}{2} bc \sin A$$

By formula:-

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\frac{1}{2} bc \sin A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\sin A = \frac{2 \times \sqrt{s(s-a)(s-b)(s-c)}}{bc} \quad \left\{ \begin{array}{l} \text{formula -} \\ \sin x = 2 \sin \frac{x}{2} \cos \frac{x}{2} \end{array} \right\}$$

$$\sin \frac{A}{2} \cos \frac{A}{2} = \frac{\sqrt{s(s-a)(s-b)(s-c)}}{bc} \quad \dots (ii)$$

We know that-

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$2 \cos^2 \frac{A}{2} - 1 = \frac{b^2 + c^2 - a^2}{2bc} \quad \left(\begin{array}{l} \text{Formula - } \cos 2A = 2 \cos^2 A - 1 \\ \cos A = 2 \cos^2 \frac{A}{2} - 1 \end{array} \right)$$

$$2 \cos^2 \frac{A}{2} = \frac{b^2 + c^2 - a^2 + 2bc}{2bc}$$

$$\cos^2 \frac{A}{2} = \frac{(b+c-a)(b+c+a)}{4bc}$$

$$\cos^2 \frac{A}{2} = \frac{(2s-a-a)2s}{4bc} \quad [\text{From equ}^n(i)]$$

$$\cos^2 \frac{A}{2} = \frac{(2s-2a)2s}{4bc}$$

$$\cos^2 \frac{A}{2} = \frac{s(s-a)}{bc}$$

$$\cos \frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}}$$

Putting the value of $\cos \frac{A}{2}$ in equation (ii)-

$$\sin \frac{A}{2} \sqrt{\frac{s(s-a)}{bc}} = \frac{\sqrt{s(s-a)(s-b)(s-c)}}{bc}$$

$$\sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$$

90. If $x = a \sin t$, $y = b \tan t$, then $\frac{a^2}{x^2} - \frac{b^2}{y^2}$ is:

- (a) 1 (b) 2
(c) 0 (d) -1

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (a) : $x = a \sin t$

$$y = b \tan t$$

$$\frac{a^2}{x^2} - \frac{b^2}{y^2}$$

$$= \frac{a^2}{a^2 \sin^2 t} - \frac{b^2}{b^2 \tan^2 t} = \frac{1}{\sin^2 t} - \frac{\cos^2 t}{\sin^2 t}$$

$$= \frac{1 - \cos^2 t}{\sin^2 t} = \frac{\sin^2 t}{\sin^2 t} = 1$$

24.

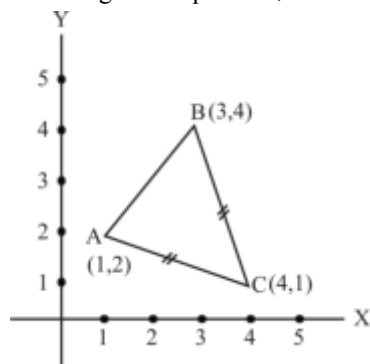
Co-ordinate Geometry

1. The points A (1, 2), B (3, 4) and C (4, 1) are the vertices of a triangle which is :

- (a) Isosceles (b) Right-angled
(c) Equilateral (d) Scalene

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,



$$AB = \sqrt{(3-1)^2 + (4-2)^2} = \sqrt{4+4} = \sqrt{8}$$

$$BC = \sqrt{(4-3)^2 + (1-4)^2} = \sqrt{1+9} = \sqrt{10}$$

$$CA = \sqrt{(1-4)^2 + (2-1)^2} = \sqrt{9+1} = \sqrt{10}$$

Thus side, $BC = CA \neq AB$

Hence, the triangle is a isosceles triangle.

2. The intercepts made by the plane $3x - 4y - 2z = 6$ with the coordinate axis are:

- (a) $-2, \frac{3}{2}, 3$ (b) $2, \frac{3}{2}, -3$
(c) $-2, -\frac{3}{2}, 3$ (d) $2, -\frac{3}{2}, -3$

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (d) : Standard equation of intercepts

$$= \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1 \dots\dots (i)$$

Plane $3x - 4y - 2z = 6$ (Given)

Dividing both side by 6

$$\frac{3x}{6} - \frac{4y}{6} - \frac{2z}{6} = \frac{6}{6}$$

$$\frac{x}{2} - \frac{2y}{3} - \frac{z}{3} = 1$$

$$\frac{x}{2} + \frac{y}{\left(-\frac{3}{2}\right)} + \frac{z}{(-3)} = 1$$

Comparing with Intercepts equation

$$a = 2$$

$$b = -\frac{3}{2}$$

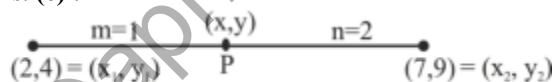
$$c = -3$$

3. Find the coordinates of the point which will divide the line joining the point (2, 4) and (7, 9) internally in the ratio 1 : 2 :

- (a) $\left(\frac{3}{8}, \frac{3}{11}\right)$ (b) $\left(\frac{5}{3}, \frac{1}{3}\right)$
(c) $\left(\frac{11}{3}, \frac{17}{3}\right)$ (d) $\left(\frac{8}{3}, \frac{11}{3}\right)$

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (c) :



We know that

$$x = \frac{nx_1 + mx_2}{m+n}, \quad y = \frac{ny_1 + my_2}{m+n}$$

$$x = \frac{2 \times 2 + 1 \times 7}{1+2} = \frac{4+7}{3} = \frac{11}{3}$$

$$y = \frac{2 \times 4 + 1 \times 9}{1+2} = \frac{8+9}{3} = \frac{17}{3}$$

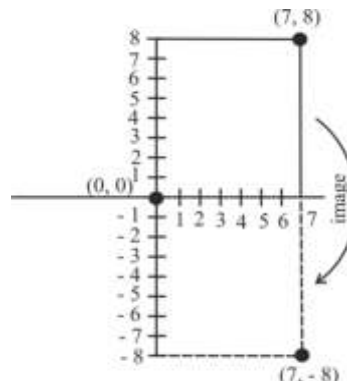
So, the point = $\left(\frac{11}{3}, \frac{17}{3}\right)$

4. The image of the point (7, 8) when reflected along the x - axis is :

- (a) (8, 7) (b) (-7, -8)
(c) (-7, 8) (d) (7, -8)

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : The reflected image of the point (7, 8) with respect to the x-axis will be as follows—



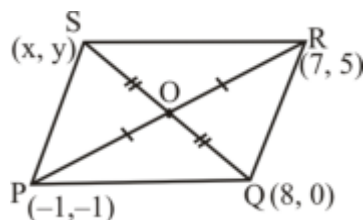
Hence, (7, -8) is reflected image.

5. In a parallelogram PQRS, P = (-1, -1), Q = (8, 0) and R = (7, 5) find the coordinates of 'S' ?

- (a) (-2, 4) (b) $\left(-2, \frac{7}{2}\right)$
(c) $\left(-\frac{3}{2}, 4\right)$ (d) (-1, 4)

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (a) : Let the coordinates of the point (S) = (x, y)



$$\text{Coordinates of midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Coordinates of the midpoint of point P (-1, -1) and point R (7, 5)-

$$\frac{-1+7}{2}, \frac{-1+5}{2}$$

$$= (3, 2) \dots \dots \dots (i)$$

Coordinates of the midpoint of point Q (8, 0) and point S (x, y) -

$$\frac{8+x}{2}, \frac{y+0}{2}$$

$$= \left(\frac{8+x}{2}, \frac{y}{2} \right)$$

On comparing with equation (i),

$$(3, 2) = \left(\frac{8+x}{2}, \frac{y}{2} \right)$$

$$3 = \frac{8+x}{2} \quad 2 = \frac{y}{2}$$

$$x = -2 \quad y = 4$$

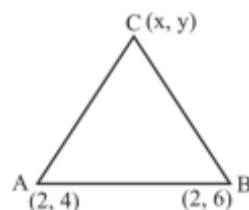
$$(x, y) = (-2, 4)$$

6. Find the third vertex of an equilateral triangle whose two vertices are (2, 4) and (2, 6).

- (a) (2, 5) (b) $(\sqrt{3}, 5)$
(c) $(2 + \sqrt{3}, 5)$ (d) $(2\sqrt{3}, 5)$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the third vertex of an equilateral triangle is (x, y).



In equilateral triangle, all sides have equal length.

$$AB = BC = AC$$

$$\text{Here, } AB = \sqrt{(2-2)^2 + (6-4)^2}$$

$$= \sqrt{(2)^2} = 2 = 2 \text{ units}$$

$$\text{And } AC = \sqrt{(2-x)^2 + (4-y)^2} = 2 \text{ units} \dots (i)$$

$$BC = \sqrt{(2-x)^2 + (6-y)^2} = 2 \text{ units} \dots (ii)$$

On comparing the equation (i) and (ii)

$$\Rightarrow \sqrt{(2-x)^2 + (4-y)^2} = \sqrt{(2-x)^2 + (6-y)^2}$$

On squaring both sides-

$$\Rightarrow (2-x)^2 + (4-y)^2 = (2-x)^2 + (6-y)^2$$

$$\Rightarrow 16 + y^2 - 8y = 36 + y^2 - 12y \Rightarrow 4y = 20$$

$$\therefore y = 5 \dots (iv)$$

Now, putting y = 5 in eqⁿ (i),

$$\sqrt{(2-x)^2 + 1} = 2$$

On squaring both sides-

$$\Rightarrow (2-x)^2 + 1 = 4 \Rightarrow (2-x)^2 = 3 \Rightarrow 2-x = \pm\sqrt{3}$$

$$\Rightarrow x = 2 \pm \sqrt{3}$$

$$\text{So, } (x, y) = (2 \pm \sqrt{3}, 5) = (2 + \sqrt{3}, 5)$$

7. ΔABC is a triangle whose vertices are A(0, 0), B(a, 5) and C(-5, 5). If the triangle is right-angled at A, then find the value of a.

- (a) 3 (b) 5
(c) 6 (d) 2

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (b) : By applying pythagoras theorem in ΔABC

$$(BC)^2 = (AC)^2 + (AB)^2$$

$$(a+5)^2 + (5-5)^2 = (-5-0)^2 + (5-0)^2 + (a-0)^2 + (5-0)^2$$

$$(a+5)^2 + 0 = 25 + 25 + a^2 + 25$$

$$a^2 + 25 + 10a = 75 + a^2$$

$$10a = 75 - 25 = 50$$

$$a = \frac{50}{10} = 5$$

$$\boxed{a = 5}$$

8. Find the area of a triangle whose vertices are $(a, b + c)$, $(a, b - c)$ and $(-a, c)$.

- (a) $2bc$ (b) $2ac$
(c) $2b(a + c)$ (d) $c(a - b)$

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (b) : Solve at—

$$x_1 = a, x_2 = a, x_3 = -a$$

$$y_1 = b + c, y_2 = b - c, y_3 = c$$

From the formula of

Area of Δ

$$\begin{aligned} &= \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)] \\ &= \frac{1}{2} [a(b - c - c) + a(c - b - c) + (-a)(b + c - b + c)] \\ &= \frac{1}{2} [a(b - 2c) + a(-b) + (-a)(2c)] \\ &= \frac{1}{2} [ab - 2ac - ab - 2ac] = \frac{1}{2} \times -4ac = -2ac = 2ac \end{aligned}$$

\therefore The area of a triangle can't be negative.

9. The area in square units of a triangle formed by the coordinate axis and the straight line $5x + 7y = 35$ is:

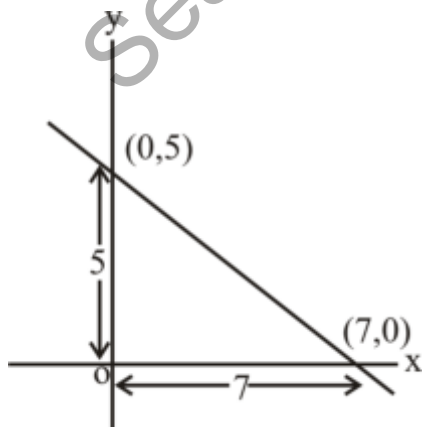
- (a) 35 (b) $\frac{35}{2}$
(c) $\frac{2}{35}$ (d) $\frac{25}{2}$

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : Given, $5x + 7y = 35$

On dividing both side by 35.

$$\frac{x}{7} + \frac{y}{5} = 1$$



$$\text{Area of triangle} = \frac{1}{2} \times 7 \times 5 = \frac{35}{2}$$

10. Find the area of a triangle formed by $(1, 0)$, $(-1, 0)$, $(0, 1)$.

- (a) 1.5 sq. units (b) 0 sq. units
(c) 1 sq. units (d) 2 sq. units

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given point $(1, 0)$, $(-1, 0)$ and $(0, 1)$

$$x_1 = 1 \quad x_2 = -1 \quad x_3 = 0$$

$$y_1 = 0 \quad y_2 = 0 \quad y_3 = 1$$

$$\text{Area of } \Delta = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

$$= \frac{1}{2} [1(0 - 1) - 1(1 - 0) + 0(0 - 0)]$$

$$= \frac{1}{2} (-1 - 1) = -\frac{2}{2}$$

$$= 1 \text{ sq. units}$$

Note- The area of a triangle can't be negative.

11. The graphs of the equations $3x - 2y - 11 = 0$ and $x + y = 7$ intersect at $P(\alpha, \beta)$. What is the value of $(3\alpha + 5\beta)$?

- (a) 13 (b) 23
(c) 25 (d) 11

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (c) : Given,

$$3x - 2y - 11 = 0$$

$$3x - 2y = 11 \quad \dots (i)$$

$$\text{and, } x + y = 7 \quad \dots (ii)$$

On multiplying by 2 in equation (ii) and adding them,

$$3x - 2y = 11$$

$$2x + 2y = 14$$

$$5x = 25$$

$$x = \frac{25}{5}$$

$$\boxed{x = 5}$$

On putting the value of x in equation (i),

$$3 \times 5 - 2y = 11$$

$$-2y = -4$$

$$y = 2$$

$$P(\alpha, \beta) = (5, 2)$$

Then, According to the question,

$$\begin{aligned} &3\alpha + 5\beta \\ &= (3 \times 5 + 5 \times 2) \\ &= 25 \end{aligned}$$

12. The straight line $kx - 3y = 6$ passes through the point (3,2). What is the value of k ?

- (a) 4 (b) 3
(c) 6 (d) 2

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (a) : According to the question,

$$\begin{aligned}\therefore k \times 3 - 3 \times 2 &= 6 \\ k \times 3 &= 12 \\ k &= 4\end{aligned}$$

13. If the centre of a circle is (-2,3) and its radius is 4, then find the equation of the circle.

- (a) $x^2 + y^2 + 4x + 6y - 3 = 0$
(b) $x^2 + y^2 + 4x - 6y - 3 = 0$
(c) $x^2 + y^2 - 4x + 6y + 3 = 0$
(d) $x^2 + y^2 - 4x + 6y - 3 = 0$

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (b) : Given, co-ordinate of centre = (-2, 3)

Radius (r) = 4

Equation of circle,

$$(x+2)^2 + (y-3)^2 = (4)^2 \quad [\because \text{Formula, } (x-\alpha)^2 + (y-\beta)^2 = r^2]$$

Where, (α, β) co-ordinate of centre and r = radius]

$$\Rightarrow x^2 + 4x + 4 + y^2 + 9 - 6y = 16$$

$$\Rightarrow x^2 + y^2 + 4x - 6y - 3 = 0$$

14. Find the equation of the tangents to the circle $x^2 + y^2 = 9$ at $x = 2$.

- (a) $2x + \sqrt{5}y = 9$
 $2x - \sqrt{5}y = 9$
(b) $-2x + \sqrt{5}y = 9$
 $2x - \sqrt{5}y = 9$
(c) $-2x - \sqrt{5}y = 9$
 $2x - \sqrt{5}y = 9$
(d) $-2x + \sqrt{5}y = 9$
 $2x - \sqrt{5}y = 9$

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given-

$$x^2 + y^2 = 9 \quad \dots(i)$$

At, $x = 2$ $4 + y^2 = 9$

$$\Rightarrow y^2 = 5$$

$$\Rightarrow y = \pm \sqrt{5}$$

On differentiating equation (i),

$$\Rightarrow \frac{dy}{dx} = \frac{-x}{y}$$

$$\Rightarrow \left(\frac{dy}{dx} \right)_{(2, \sqrt{5})} = m_1 = \frac{-2}{\sqrt{5}}$$

$$\Rightarrow \left(\frac{dy}{dx} \right)_{(2, -\sqrt{5})} = m_2 = \frac{2}{\sqrt{5}}$$

Equation of tangent-

$$\Rightarrow y - y_1 = m(x - x_1)$$

$$\Rightarrow y - \sqrt{5} = \frac{-2}{\sqrt{5}}(x - 2) \quad (\because \text{on putting } m = m_1)$$

$$\Rightarrow 2x + \sqrt{5}y = 9$$

Again $y + \sqrt{5} = \frac{2}{\sqrt{5}}(x - 2) \quad \{\because \text{on putting } m = m_2\}$

$$\Rightarrow 2x - \sqrt{5}y = 9$$

Hence, option (a) is correct.

15. The equation of a straight line passing through (-2, 5) and (1, 3) is:

- (a) $2x - 3y - 19 = 0$ (b) $2x + 2y + 19 = 0$
(c) $3x - 2y - 11 = 0$ (d) $2x + 3y - 11 = 0$

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (d) : The equation of straight line passing through two points (x_1, y_1) and (x_2, y_2).

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

As per question, the required equation is

$$y - 5 = \frac{3 - 5}{1 + 2}(x + 2)$$

$$3y - 15 = -2x - 4$$

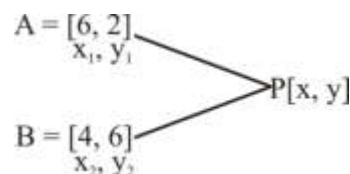
$$2x + 3y - 11 = 0$$

16. Find the relation between x and y such that the point (x, y) is equidistant from (6, 2) and (4, 6).

- (a) $2x - y = 3$ (b) $2x + y = -3$
(c) $x + 2y = 3$ (d) $x - 2y = -3$

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (d) : Given,



$$d_{AP} = d_{BP}$$

⇒ From formula–

$$\sqrt{(x-x_1)^2 + (y-y_1)^2} = \sqrt{(x-x_2)^2 + (y-y_2)^2}$$

On squaring both side

$$\begin{aligned} &= (x-6)^2 + (y-2)^2 = (x-4)^2 + (y-6)^2 \\ &= x^2 + 36 - 12x + y^2 + 4 - 4y = x^2 + 16 - 8x + y^2 + 36 - 12y \\ &= -12x + 8x - 4y + 12y + 40 - 52 = 0 \\ &-4x + 8y - 12 = 0 \end{aligned}$$

$$x - 2y = -3$$

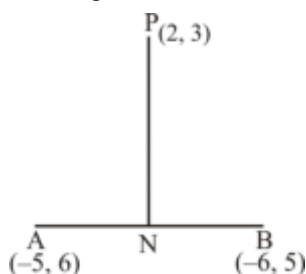
17. Equation of the line, passing through (2, 3) and perpendicular to the line joining to (-5, 6) and (-6, 5) is:

- (a) $x + y - 5 = 0$ (b) $x - y + 5 = 0$
(c) $x - y - 5 = 0$ (d) $x + y + 5 = 0$

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (a) : Let, the slope of the PN line = m

And, the slope of the AB line = n



$$n = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 6}{-6 + 5}$$

$$n = 1$$

According to the question, If both the lines are perpendicular then.

$$n \cdot m = -1$$

$$1 \cdot m = -1$$

$$m = -1$$

Hence, the equation of the line which slope $m = -1$ and passing through (2, 3)-

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -1(x - 2)$$

$$y - 3 = -x + 2$$

$$x + y - 5 = 0$$

18. Find the number of points on the x-axis that are at a distance of 'c' units ($c < 3$) from the point (2, 3)

- (a) 0 (b) 2
(c) 3 (d) 1

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (a) : Distance of 'c' units from the point (2, 3) let the other points on X-axis be (x, 0)

Therefore, the number of required point will be equal to the number of possible value of x

By distance formula –

$$\left(\sqrt{(x-2)^2 + (0-3)^2} \right)^2 = c^2$$

$$(x-2)^2 + 9 = c^2$$

As $c > 3$

$$0 < c^2 < 9$$

$$(x-2)^2 + 9 < 9$$

$$(x-2)^2 < 0, \text{ which is not possible.}$$

Hence, option (a) is correct.

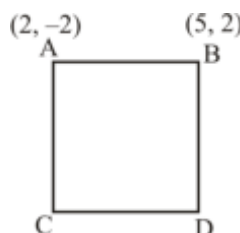
It is a contradiction, that there is no point exists. Hence the number of points on the x-axis at a distance of c unit is 0.

19. If (2, -2) and (5, 2) are two consecutive vertices of a square, then the length of each side of the square will be:

- (a) $\sqrt{5}$ units (b) $\frac{5}{\sqrt{2}}$ units
(c) $5\sqrt{2}$ units (d) 5 units

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,



$$\text{Length of side of Square} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\begin{aligned} &= \sqrt{(5-2)^2 + (2+2)^2} = \sqrt{(3)^2 + (4)^2} = \sqrt{9+16} = \sqrt{25} \\ &= 5 \text{ units} \end{aligned}$$

20. If the distance between two points (x, 7) and (1, 15) is 10 units, then the possible values of x = ?

- (a) 4, 5 (b) 3, 7
(c) 5, -7 (d) 7, -5

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (d) : Distance between points $(x, 7)$ and $(1, 15)$

$$x_1 = 1, x_2 = x$$

$$y_1 = 15, y_2 = 7$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(x-1)^2 + (7-15)^2} = 10$$

On squaring both sides,

$$(x-1)^2 + (7-15)^2 = 100$$

$$(x-1)^2 + 64 = 100$$

$$(x-1)^2 = 100 - 64 = 36$$

$$x-1 = \pm 6$$

$$x = (+6+1) \text{ and } (-6+1)$$

$$x = 7, -5$$

Hence value of x is 7 and -5.

21. The distance from the origin to the line $4x + 3y = 6$ is:

- (a) $\frac{7}{5}$ (b) $\frac{3}{5}$
(c) $\frac{4}{5}$ (d) $\frac{6}{5}$

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (d) : Distance of the line $ax + by + c = 0$ from point (x, y)

$$d = \left| \frac{ax + by + c}{\sqrt{a^2 + b^2}} \right|$$

So, distance of $4x + 3y + 6 = 0$ From origin $(0, 0)$ is

$$d = \frac{4 \times 0 + 3 \times 0 + 6}{\sqrt{16 + 9}}$$

$$d = \frac{6}{\sqrt{25}}$$

$$\boxed{d = \frac{6}{5}}$$

22. Find the value of the angle subtended between the graph of linear equation $35X - 35Y + 15 = 0$ and X-axis.

- (a) 35° (b) 50°
(c) 45° (d) 55°

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (c) : $35X - 35Y + 15 = 0$

$$\Rightarrow 35Y = 35X + 15$$

$$\Rightarrow Y = \frac{35X}{35} + \frac{15}{35}$$

$$\Rightarrow Y = X + \frac{15}{35}$$

Comparing with $y = mx + c$, $m = \tan \theta = 1 \Rightarrow \boxed{\theta = 45^\circ}$

23. Find the length of the tangent drawn from the point $(2, 3)$ to the circle $x^2 + y^2 = 4$.

- (a) 2 (b) 3
(c) 1 (d) 4

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (b) : The equation of the given circle is

$$x^2 + y^2 = 4$$

$$x^2 + y^2 - 4 = 0$$

On comparing with the general equation of the circle

$$x_1^2 + y_1^2 + 2gx_1 + 2hy_1 + k = 0$$

For the length of the tangent drawn from the point $(2, 3)$ to the given circle,

$$x_1 = 2, y_1 = 3, g = 0, h = 0, k = -4$$

$$\text{Length of the tangent} = \sqrt{x_1^2 + y_1^2 + 2gx_1 + 2hy_1 + k}$$

$$= \sqrt{2^2 + 3^2 - 4}$$

$$= \sqrt{4 + 9 - 4}$$

$$= \sqrt{9}$$

$$= 3$$

24. If the length of the tangent from $(2, 5)$ to $x^2 + y^2 - 5x + 4y + k = 0$ is $\sqrt{37}$ units, then the value of k is:

- (a) -2 (b) -1
(c) 2 (d) 1

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (a) : On comparing $x^2 + y^2 - 5x + 4y + k = 0$ with $x^2 + y^2 + 2gx + 2fy + c = 0$,

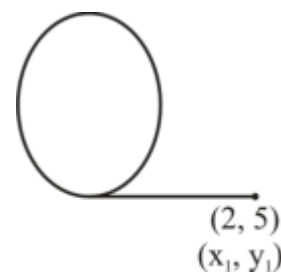
$$2g = -5$$

$$g = -5/2$$

$$\text{and } 2f = 4$$

$$f = 2$$

$$c = k$$



$$\text{Length of the tangent} = \sqrt{x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + k}$$

$$\sqrt{37} = \sqrt{(2)^2 + (5)^2 + 2\left(-\frac{5}{2}\right)(2) + 2(2)(5) + k}$$

On squaring both sides-

$$37 = 4 + 25 - 10 + 20 + k$$

$$37 = 49 - 10 + k$$

$$k = 37 - 39$$

$$k = -2$$

25. The position of the point (1, 2) with respect to the circle $x^2 + y^2 - 3x - 4y + 1 = 0$

- (a) Lies on the circle
(b) Cannot be decided
(c) Lies outside the circle
(d) Lies inside the circle

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (d) : $x^2 + y^2 - 3x - 4y + 1 = 0$

Equation of the circle, $x^2 + y^2 + 2gx + 2fy + c = 0$

$S = x^2 + y^2 - 3x - 4y + 1 \dots\dots\dots$ (Given)

On putting the value of the point (1, 2) in the equation of given circle,

$$S = 1 + 4 - 3 - 8 + 1$$

$S = -5$ (-ve) \Rightarrow The point (1, 2) will be inside the circle.

Note-

- (i) When $S > 0$, then the point will be outside the circle.
(ii) When $S < 0$, then the point will be inside the circle.
(iii) When $S = 0$, then the point will be on the circumference of the circle.

26. The position of the point (3, 4) with respect to the circle $x^2 + y^2 - 3x - 4y + 1 = 0$

- (a) Lies on it
(b) Lies outside of it
(c) Lies inside it
(d) Cannot be decided

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : Given,

$$S = x^2 + y^2 - 3x - 4y + 1 = 0 \quad (i)$$

We know that for any point (x,y),

$S > 0$ then the point (x, y) will be outside the circle.

$S < 0$, then the point (x, y) will be inside the circle.

$S = 0$ then the point (x, y) will lie on the circle.

On putting the value of (x, y) = (3, 4) in eqⁿ (i),

$$S = 9 + 16 - 9 - 16 + 1 = 1$$

$\Rightarrow S > 0$, Hence (3, 4) will be outside the circle.

27. Find the radius of the circle $x^2 + y^2 + 7x + 4y + 9 = 0$

- (a) $\frac{\sqrt{13}}{2}$ (b) $\frac{\sqrt{19}}{2}$
(c) $\frac{\sqrt{29}}{2}$ (d) $\frac{\sqrt{23}}{2}$

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (c) : On, comparing $x^2 + y^2 + 7x + 4y + 9 = 0$ with

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

$$2g = 7 \quad 2f = 4 \quad \text{and} \quad c = 9$$

$$\Rightarrow g = 7/2 \quad \Rightarrow f = 2$$

$$\text{So radius} = \sqrt{g^2 + f^2 - c}$$

$$= \sqrt{\left(\frac{7}{2}\right)^2 + 4 - 9}$$

$$= \sqrt{\frac{49}{4} + 4 - 9}$$

$$= \sqrt{\frac{49 + 16 - 36}{4}} = \sqrt{\frac{29}{4}} = \frac{\sqrt{29}}{2}$$

28. The angle between two circles $x^2 + y^2 - 12x - 6y + 41 = 0$ and $x^2 + y^2 + kx + 6y - 59 = 0$ is 45° . Find the value of k.

- (a) ± 3 (b) -4
(c) 4 (d) ± 4

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : On comparing the equation of circle $x^2 + y^2 - 12x - 6y + 41 = 0$ and $x^2 + y^2 + kx + 6y - 59 = 0$ with equation $x^2 + y^2 + 2gx + 2fy + c = 0$,

$$g_1 = -6, f_1 = -3, c_1 = 41$$

$$g_2 = k/2, f_2 = 3, c_2 = -59$$

We know that,

$$\cos \theta = \frac{c_1 + c_2 - 2g_1 \cdot g_2 - 2f_1 \cdot f_2}{2\sqrt{g_1^2 + f_1^2 - c_1} \sqrt{g_2^2 + f_2^2 - c_2}}$$

$$\cos 45^\circ = \frac{41 - 59 - 2(-6)\frac{k}{2} - 2(-3)3}{2\sqrt{36 + 9 - 41} \sqrt{\frac{k^2}{4} + 9 - 59}}$$

$$\frac{1}{\sqrt{2}} = \frac{-18 + 6k + 18}{2 \times 2 \sqrt{\frac{k^2}{4} + 68}}$$

$$\frac{1}{\sqrt{2}} = \frac{6k}{4\sqrt{\frac{k^2}{4} + 68}}$$

On squaring both sides-

$$\frac{1}{2} = \frac{36k^2}{16\left(\frac{k^2}{4} + 68\right)}$$

$$4\left(\frac{k^2}{4} + 68\right) = 18k^2$$

$$4\left(\frac{k^2 + 272}{4}\right) = 18k^2$$

$$k^2 + 272 = 18k^2$$

$$17k^2 = 272$$

$$k^2 = 16$$

$$K = \pm 4$$

Type - 1

Problems Based on Lines and Angles

1. In $\triangle ABC$ $\angle A : \angle B : \angle C = 2 : 3 : 5$, then find the measure of the supplementary angle of $\angle A$.

- (a) 154° (b) 36°
(c) 144° (d) 54°

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (c) : Given,

$$\angle A : \angle B : \angle C = 2 : 3 : 5$$

$$\therefore 2x + 3x + 5x = 180^\circ$$

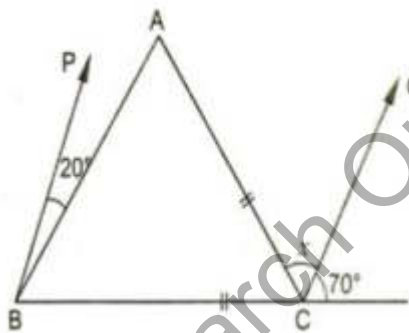
$$10x = 180^\circ$$

$$x = 18^\circ$$

$$\therefore \angle A = 2x = 2 \times 18^\circ = 36^\circ$$

$$\begin{aligned} \text{Hence the supplementary angle of } \angle A &= 180^\circ - \angle A \\ &= 180^\circ - 36^\circ \\ &= 144^\circ \end{aligned}$$

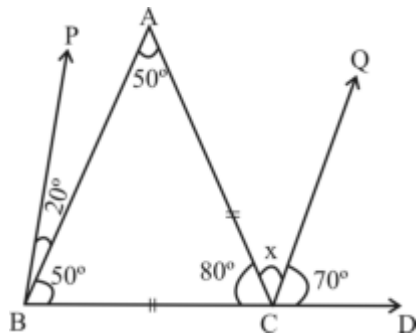
2. In the given figure, if $BP \parallel CQ$ and $AC = BC$, then the measure of x is:



- (a) 20° (b) 25°
(c) 30° (d) 35°

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (c) :



Given that, $BP \parallel CQ$ and
 $AC = BC$

$$\angle PBC = \angle QCD = 70^\circ$$

$$\angle PBA + \angle ABC = 70^\circ$$

$$\angle ABC = 70^\circ - 20^\circ = 50^\circ$$

$$\therefore \angle BAC = 50^\circ$$

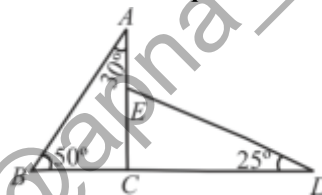
$$\angle BCA = 180^\circ - 2 \times 50^\circ = 80^\circ$$

$$\angle BCA + \angle ACQ + \angle QCD = 180^\circ$$

$$80^\circ + x + 70^\circ = 180^\circ$$

$$x = 30^\circ$$

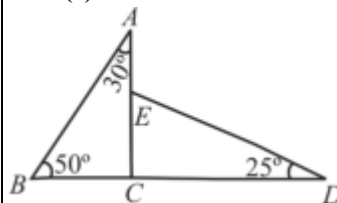
3. In the given diagram, if $\angle BAC = 30^\circ$, $\angle ABC = 50^\circ$ and $\angle CDE = 25^\circ$, then $\angle AED$ is equal to:



- (a) 75° (b) 95°
(c) 105° (d) 115°

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (c) :



In $\triangle ABC$

$$\therefore \angle BCA = 180^\circ - \angle BAC - \angle ABC$$

$$= 180^\circ - 30^\circ - 50^\circ$$

$$= 100^\circ$$

$$\therefore \angle ACD = 180^\circ - 100^\circ$$

$$\angle ACD = 80^\circ \text{ [From linear pair property]}$$

\therefore Exterior angle is the sum of two interior angle of a triangle.

$$\Rightarrow \angle AED = \angle ACD + \angle CDE$$

$$= 80^\circ + 25^\circ$$

$$= 105^\circ$$

4. Two adjacent angles form an angle of 100° . The larger angle is 20° less than five times the smaller angle. The larger angle is:

- (a) 75° (b) 90°
(c) 70° (d) 80°

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the small angle = x
then the large angle = $5x - 20^\circ$
According to the question,

$$x + 5x - 20^\circ = 100^\circ$$

$$6x = 120^\circ$$

$$\boxed{x = 20^\circ}$$

$$\begin{aligned}\text{Hence the larger angle} &= 5 \times 20^\circ - 20^\circ \\ &= 100^\circ - 20^\circ \\ &= 80^\circ\end{aligned}$$

5. What is the sum of the angle complementary to 15° and the angle supplementary to 125° ?

- (a) 135° (b) 120°
(c) 130° (d) 150°

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (c) : Two angle is called complementary when their measures add to 90 degrees.

$$\angle A + \angle B = 90^\circ$$

Supplementary angles are two angles whose measures add up to 180°

$$\angle A + \angle B = 180^\circ$$

According to the question,

$$\text{Complementary angle} = \angle A + \angle B = 90^\circ$$

$$= \angle 15^\circ + \angle B = 90^\circ$$

$$\angle B = 75^\circ$$

$$\text{Supplementary angle} = \angle A + \angle B = 180^\circ$$

$$= 125 + \angle B = 180^\circ$$

$$\angle B = 55^\circ$$

$$\text{Sum of Angle} = 75^\circ + 55^\circ = 130^\circ$$

6. How many degrees does an angle that is $1/5$ of its supplementary angle?

- (a) 45° (b) 30°
(c) 60° (d) 75°

RRB NTPC 04.04.2016 Shift : 2

Ans : (b) Suppose an angle = x°

$$\text{Its supplementary angle} = 5x^\circ$$

$$\text{Sum of two supplementary angle} = 180^\circ$$

$$x + 5x = 180^\circ$$

$$6x = 180 \Rightarrow x = 30^\circ$$

$$\text{Required angle} = 30^\circ$$

7. If two supplementary angles are in the ratio 4:5, Find the larger angle.

- (a) 80° (b) 50°
(c) 60° (d) 100°

RRB NTPC 16.04.2016 Shift : 1

Ans : (d) Suppose angle is $4x^\circ$ and $5x^\circ$ respectively
We know that sum of two supplementary angle is 180° .

$$\therefore 4x^\circ + 5x^\circ = 180^\circ$$

$$9x^\circ = 180^\circ$$

$$x^\circ = 20^\circ$$

$$\therefore \text{larger angle } (5x^\circ) = 5 \times 20^\circ = 100^\circ$$

8. If $(6y+70)^\circ$ and $(3y+47)^\circ$ are supplementary angles, find the value of y .

- (a) 12 (b) 15
(c) 7 (d) 10

RRB NTPC 12.04.2016 Shift : 2

Ans : (c) $(6y + 70)^\circ + (3y + 47)^\circ = 180^\circ$

$$6y^\circ + 70^\circ + 3y^\circ + 47^\circ = 180^\circ$$

$$9y^\circ + 117^\circ = 180^\circ$$

$$9y^\circ = 180^\circ - 117^\circ$$

$$9y^\circ = 63^\circ, \quad y^\circ = 7^\circ$$

9. If $(7x + 5)^\circ$ and $(x + 5)^\circ$ are complementary angles, then find value of x .

- (a) 10° (b) 20°
(c) 30° (d) 40°

RRB NTPC 12.04.2016 Shift : 3

Ans : (a) We know that sum of complementary angles is equal to 90°

\therefore According to the question,

$$(7x + 5)^\circ + (x + 5)^\circ = 90^\circ$$

$$\Rightarrow 7x^\circ + 5^\circ + x^\circ + 5^\circ = 90^\circ$$

$$\Rightarrow 8x^\circ = 90^\circ - 10^\circ$$

$$8x^\circ = 80^\circ$$

$$x^\circ = \frac{80^\circ}{8} = 10^\circ$$

10. The ratio of two complementary angles are 4:5, find the ratio of the square of the first angle to the square of the second angle.

- (a) 16 : 25 (b) 64 : 125
(c) 100 : 125 (d) 25 : 16

RRB NTPC 28.04.2016 Shift : 2

Ans : (a) Suppose both complementary angle are $4x^\circ$ and $5x^\circ$ respectively

$$\therefore 4x^\circ + 5x^\circ = 90^\circ$$

$$9x^\circ = 90^\circ$$

$$x^\circ = 10^\circ$$

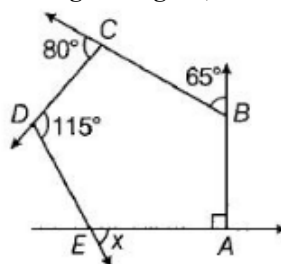
$$\therefore \text{First complementary angle} = 40^\circ$$

$$\text{Second complementary angle} = 50^\circ$$

$$\therefore \text{Required ratio} = (40)^2 : (50)^2$$

$$= 1600 : 2500 = 16 : 25$$

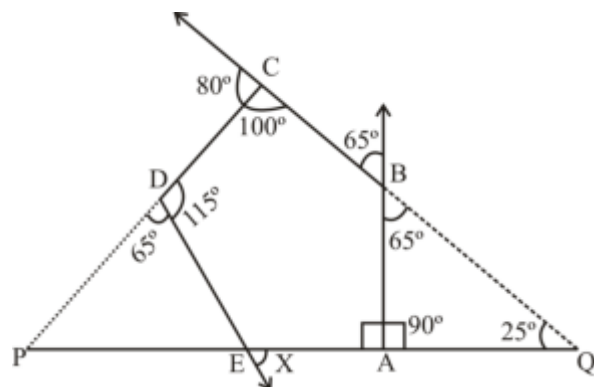
11. In the given figure, value of x is:



- (a) 65° (b) 70°
(c) 55° (d) 60°

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (d) :



In the given figure, on extending CD and AE to P and CB and EA to Q.

In $\triangle PCQ$

$$\angle P + \angle C + \angle Q = 180^\circ$$

$$\angle P + 100 + 25 = 180^\circ$$

$$\angle P + 125 = 180^\circ$$

$$\angle P = 55^\circ$$

In $\triangle PDE$

$$\angle E = 180^\circ - 55^\circ - 65^\circ$$

$$\angle E = 60^\circ$$

$$\angle x = \angle E \quad (\because \text{Vertically opposite angle})$$

$$\angle x = 60^\circ$$

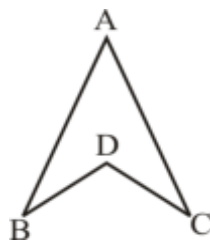
12. When an arm of an angle is extended to double its length, then the measure of the angle:

- (a) remains the same (b) triples
(c) doubles (d) becomes half

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (a) : If the length of the side of an angle increased two times then the measure of that angle remains the same.

13. If the given figure, $\angle ABD = 55^\circ$ and $\angle ACD = 30^\circ$. If $\angle BAC = y^\circ$ and non-reflex $\angle BDC = x^\circ$, then what is the value of 'x - y'?



- (a) 95 (b) 15
(c) 85 (d) 105

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (c) :

Given,

$$\angle ABD = 55^\circ$$

$$\angle ACD = 30^\circ$$

$$\angle BAC = y^\circ$$

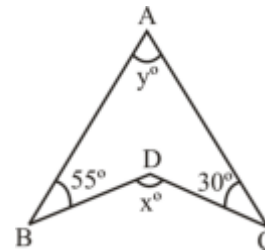
and

$$\angle BDC = x^\circ$$

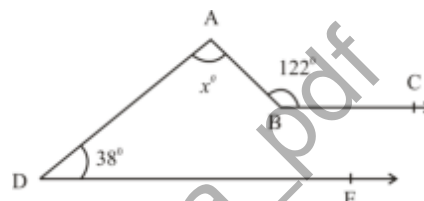
In figure –

$$x^\circ = y^\circ + 55^\circ + 30^\circ$$

$$(x^\circ - y^\circ) = 85^\circ$$



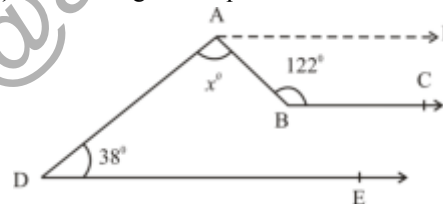
14. In the given figure, $BC \parallel DE$ then find the value of x



- (a) 20° (b) 84°
(c) 142° (d) 38°

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question –



$BC \parallel DE \parallel AF$

$$\angle FAB + \angle ABC = 180^\circ \quad (\text{Interior angle})$$

$$\angle FAB = 180^\circ - 122^\circ = 58^\circ$$

$$\angle FAD + \angle ADE = 180^\circ \quad (\text{Interior angle})$$

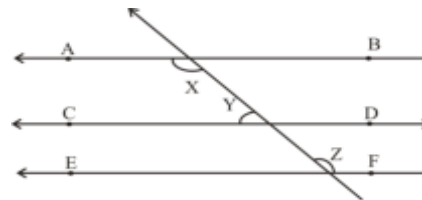
$$\angle FAB + \angle BAD + 38^\circ = 180^\circ$$

$$58^\circ + x^\circ + 38^\circ = 180^\circ$$

$$x^\circ = 180^\circ - 96^\circ$$

$$x = 84^\circ$$

15.



In the given figure, the three parallel lines are cut through by a transversal. Of the marked angles, the greater two are of equal measure. The ratio of a greater angle to the smaller angle is 7 : 3. What is the measure of the greater angle?

- (a) 110° (b) 90°
(c) 18° (d) 126°

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (d) : Let, y is a smaller angle

So, $y = 3x$

and, z is a greater angle

So, $z = 7x$

$\angle z = \angle x$ by alternate angle

$\angle x + \angle y = \angle z + \angle y = 180^\circ$

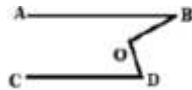
$7x + 3x = 180^\circ$

$10x = 180^\circ$

$x = 18^\circ$

So, now, greater angle $= \angle z = 7x = 7 \times 18 = 126^\circ$

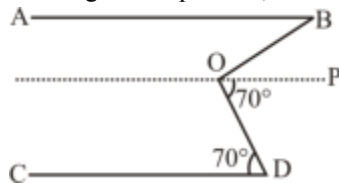
16. In the given figure, AB and CD are parallel lines. O is a point such that angle $CDO = 70^\circ$ and angle $DOB = 100^\circ$. Find angle ABO .



- (a) 50° (b) 80°
(c) 60° (d) 30°

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question,



$\angle CDO = 70^\circ$

$\angle CDO = \angle POD$ (Alternate angle)

$\angle POD = 70^\circ$

$\angle BOP = 100 - 70 = 30^\circ$

$\angle ABO = \angle BOP$ (Alternate angle)

$\angle ABO = 30^\circ$

17. The sum of two angles is 155° and their difference is $\frac{\pi}{2}$. The value of the greater angle (in radians) is:

- (a) $\frac{53\pi}{72}$ (b) $\frac{47\pi}{72}$
(c) $\frac{49\pi}{72}$ (d) $\frac{51\pi}{72}$

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (c) : Let two angles are $\angle A$ and $\angle B$ respectively

According to the question,

$$\angle A + \angle B = 155^\circ \quad \dots\dots\dots(i)$$

$$\angle A - \angle B = \frac{\pi}{2} = 90^\circ \quad \dots\dots\dots(ii)$$

$$2\angle A = 245^\circ$$

$$\angle A = \frac{245^\circ}{2}$$

On putting the value of $\angle A$ in equation (i)-

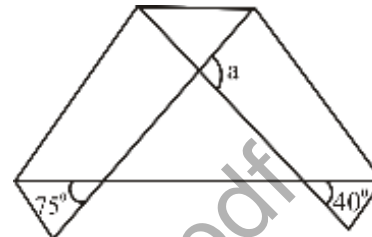
$$\angle A + \angle B = 155^\circ$$

$$\angle B = 155^\circ - \frac{245^\circ}{2} = \frac{65^\circ}{2}$$

\therefore Value of greater angle in radian

$$= \frac{245^\circ}{2} \times \frac{\pi}{180} = \frac{49\pi}{72}$$

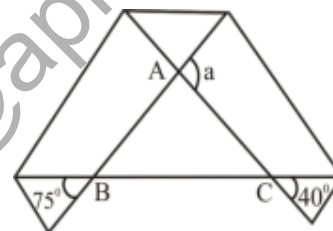
18. What is the value of a ?



- (a) 65° (b) 75°
(c) 105° (d) 115°

RRB NTPC 29.03.2016 Shift : 3

Ans : (d)



$\angle ABC = 75^\circ$ (opposite angle)

$\angle ACB = 40^\circ$ (opposite angle)

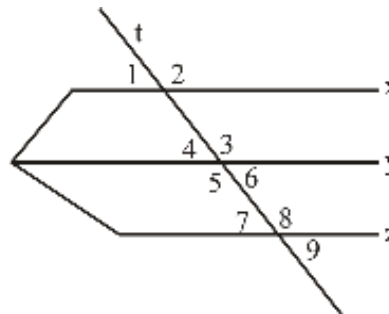
$\therefore \angle BAC = 180^\circ - (75^\circ + 40^\circ)$

$= 180^\circ - 115^\circ = 65^\circ$

but $\angle BAC + a = 180^\circ$ (angle of Linear pair)

$$a = 180^\circ - 65^\circ = 115^\circ$$

- 19.



x , y and z are parallel lines and t is a transversal intersecting them all. Which of the following lists of angles is the same?

- (a) 2, 3, 5
(b) 2, 6, 8
(c) 1, 4, 9
(d) 4, 5, 7

RRB NTPC 31.03.2016 Shift : 1

Ans : (c) $\angle 1 = \angle 4$ (Corresponding angle)
 $\angle 4 = \angle 6$ (Vertical opposite angle)
 $\angle 6 = \angle 9$ (Corresponding angle)

So angles 1, 4, 9 are equal/same

20. Consider the following Statements, and choose the correct option:-

When two straight lines intersect each other, then

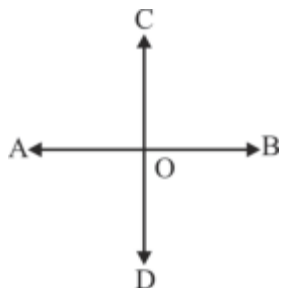
1. Adjacent angles are complementary.

2. Opposite angles are complementary.

- (a) Both 1 and 2 are incorrect.
 (b) Both 1 and 2 are correct.
 (c) 1 is incorrect and 2 is correct.
 (d) 1 is correct and 2 is incorrect.

RRB NTPC 16.04.2016 Shift : 1

Ans : (d)



When two straight lines intersect each other then adjacent angle be complementary angle.

21. Horizontal lines are on the same line.

- (a) Equal in length
 (b) Parallel to each other
 (c) Intersecting each other
 (d) Form triangle

RRB NTPC 29.04.2016 Shift : 1

Ans : (b) Horizontal line on one line is parallel of each other.

Type - 2

Problems Based on Triangles

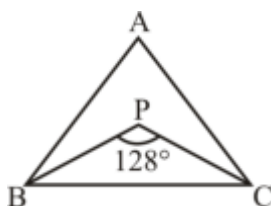
22. In $\triangle ABC$, the bisectors of $\angle B$ and $\angle C$ intersect at P inside the triangle. If $\angle BPC = 128^\circ$, then what is the measure of $\angle A$?

- (a) 82° (b) 76°
 (c) 78° (d) 52°

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (b) : Given,

$$\angle BPC = 128^\circ$$



$$\therefore \angle BPC = 90^\circ + \frac{\angle A}{2}$$

$$\Rightarrow 128^\circ = 90^\circ + \frac{\angle A}{2}$$

$$\Rightarrow \frac{\angle A}{2} = 38^\circ$$

$$\Rightarrow \angle A = 76^\circ$$

23. The bisector of $\angle QPR$ of $\triangle PQR$ meets the side QR at S. If PQ = 12 cm, PR = 15 cm and QR = 18 cm, then the length of SR is

- (a) 8 cm (b) 13 cm
 (c) 10 cm (d) 12 cm

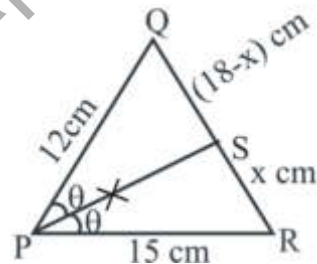
RRB NTPC (Stage-II) -14/06/2022 (Shift-II)

Ans. (c) : Given,

$$PQ = 12 \text{ cm}$$

$$PR = 15 \text{ cm}$$

$$QR = 18 \text{ cm}$$



Let $SR = x \text{ cm}$

Then,

From Angle Bisector Theorem-

$$\frac{PQ}{PR} = \frac{QS}{SR}$$

$$\frac{12}{15} = \frac{18-x}{x}$$

$$9x = 90$$

$$x = \frac{90}{9}$$

$$x = 10$$

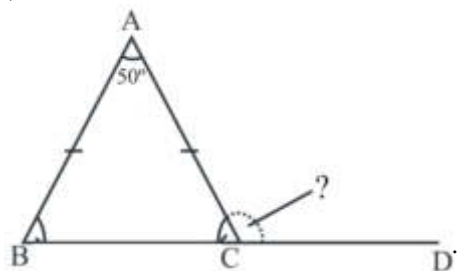
Hence, $SR = 10 \text{ cm}$

24. ABC is an isosceles triangle in which $AB = AC$ and $\angle BAC = 50^\circ$. Side BC is extended to D. Find the measure of $\angle ACD$.

- (a) 115° (b) 110°
 (c) 100° (d) 130°

RRB NTPC (Stage-II) 17/06/2022 (Shift-I)

Ans. (a) :



Let $\angle ABC = \angle ACB = K$
 $\angle BAC + \angle ABC + \angle ACB = 180^\circ$
 $50^\circ + K + K = 180^\circ$
 $2K = 130^\circ$
 $K = 65^\circ$
 So, $\angle ACD + \angle ACB = 180^\circ$
 $\angle ACD + 65^\circ = 180^\circ$
 $\angle ACD = 180^\circ - 65^\circ$
 $\angle ACD = 115^\circ$

25. The sides of a triangle are in the ratio 3 : 4 : 5
 The triangle is :
 (a) Obtuse triangle
 (b) Right triangle
 (c) Acute triangle
 (d) Either acute triangle or right triangle

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (b) : Given:

Ratio of the sides of a triangle = 3 : 4 : 5
 Let the sides be $3x$, $4x$ and $5x$ respectively.
 By Pythagoras theorem,

$$(5x)^2 = (3x)^2 + (4x)^2$$

$$25x^2 = 9x^2 + 16x^2$$

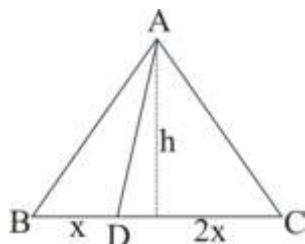
$$25x^2 = 25x^2$$

Hence, this triangle is a right angled triangle.

26. The base BC of a triangle, ABC is divided at D such that $BD = \frac{1}{2} DC$. The area of triangle ABC is _____ times the area of triangle ADC.
 (a) Four (b) $\frac{3}{2}$
 (c) Two (d) Three

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (b) :



According to the question-

$$DC = 2x$$

$$BC = 3x$$

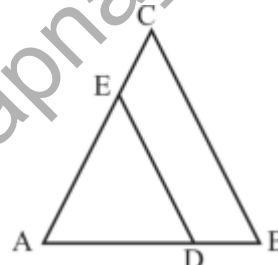
$$\text{Area of } \triangle ABC = \frac{1}{2} \times 3x \times h$$

$$\text{Area of } \triangle ADC = \frac{1}{2} \times 2x \times h$$

$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle ADC} = \frac{\frac{1}{2} \times 3x \times h}{\frac{1}{2} \times 2x \times h} = \frac{3}{2}$$

$$\text{Area of } \triangle ABC = \frac{3}{2} \text{ Area of } \triangle ADC$$

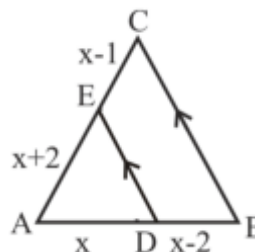
27. In the given figure, $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, then find the value of x .



- (a) 5 (b) 3
 (c) 4 (d) 2

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,



$DE \parallel BC$

\Rightarrow If a line is drawn parallel to one side of a triangle it divides the other two sides in equal proportion.

$$\Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$$

$$\frac{x}{x-2} = \frac{x+2}{x-1}$$

$$(x+2)(x-2) = x(x-1)$$

$$x^2 - 4 = x^2 - x$$

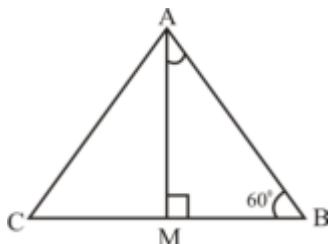
$$x = 4$$

28. Angles A, B and C of a triangle are in arithmetic progression. M is a point on BC such that AM is perpendicular to BC. What is $\frac{BM}{AB}$?

- (a) $\frac{1}{2}$ (b) $\frac{3}{4}$
(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (a) :



According to the question,

Because angle A, B and C are in arithmetic progression

$$A + C = 2B \text{ ---- (1)}$$

$$A + B + C = 180^\circ \text{ -- (2)}$$

(On Substituting the value of A + C from equation (1))

$$2B + B = 180^\circ$$

$$3B = 180^\circ$$

$$B = 60^\circ$$

$$\cos 60^\circ = \frac{BM}{AB} \left(\frac{\text{Base}}{\text{Hypotenuse}} \right)$$

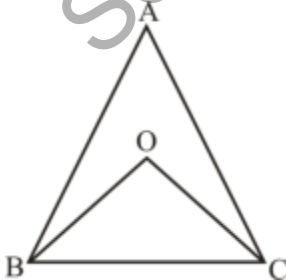
$$\frac{1}{2} = \frac{BM}{AB}$$

29. In a triangle ABC, incenter is at O, find angle BAC if angle BOC = 110° .

- (a) 40° (b) 50°
(c) 30° (d) 20°

RRB NTPC 03.02.2021 (Shift-II) Stage I

Ans. (a) :



Given- $\angle BOC = 110^\circ$

$$\angle BOC = 90^\circ + \frac{1}{2} \angle A$$

$$110^\circ = 90^\circ + \frac{\angle A}{2}$$

$$\frac{\angle A}{2} = 20^\circ$$

$$\angle A = 40^\circ$$

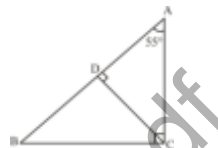
Hence, $\angle BAC = 40^\circ$

30. If $\triangle ABC$ is right angled at C $CD \perp AB$, $\angle A = 55^\circ$ then, $\angle ACD = ?$

- (a) 60° (b) 45°
(c) 35° (d) 55°

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) :



Given-

$$CD \perp AB, \angle A = 55^\circ$$

In right angle $\triangle ADC$,

$$\angle DAC + \angle CDA + \angle ACD = 180^\circ$$

$$55^\circ + 90^\circ + \angle ACD = 180^\circ$$

$$\angle ACD = 180^\circ - 145^\circ$$

$$\angle ACD = 35^\circ$$

31. The perimeters of two similar triangles, $\triangle PQR$ and $\triangle XYZ$ are 48 cm and 24 cm respectively. If $XY = 12$ cm, then PQ is:

- (a) 12 cm (b) 8 cm
(c) 24 cm (d) 18 cm

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (c) : $\because \triangle PQR \sim \triangle XYZ$

$$\therefore \frac{48}{24} = \frac{PQ}{12}$$

$$PQ = 48/2$$

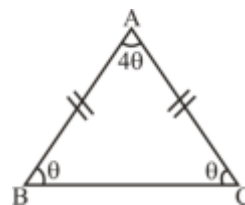
$$PQ = 24 \text{ cm.}$$

32. The number of non-congruent acute isosceles triangles in which one angle is 4 times another angle is:

- (a) 3 (b) 4
(c) 1 (d) 2

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (c) :



So,

$$\theta + \theta + 4\theta = 180^\circ$$

$$6\theta = 180^\circ$$

$$\theta = 30^\circ$$

So, equal angle = $30^\circ, 30^\circ$
 And remaining third angle = $4\theta = 4 \times 30^\circ = 120^\circ$
 (Obtuse angle)

Which is invalid triangle According to the question.

(ii) If both equal angle is 4θ and third angle is θ -

$$4\theta + 4\theta + \theta = 180^\circ$$

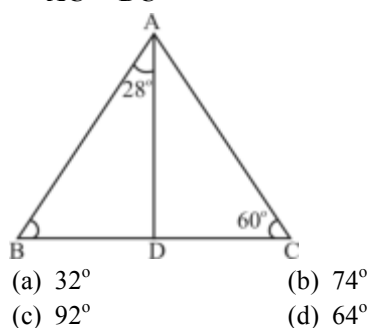
$$9\theta = 180^\circ$$

$$\theta = 20^\circ$$

So, equal angle = $80^\circ, 80^\circ$

And the remaining 3rd angle is 20° which is an acute angled isosceles is a triangle. Thus only one triangle is possible.

33. If, $\frac{AB}{AC} = \frac{BD}{DC}$ then $\angle ABC$ is:



RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (d) : In $\triangle ABC$,

By angle bisector theorem-

$$\therefore \angle BAD = \angle DAC$$

$$\Rightarrow \angle DAC = 28^\circ$$

Now, in $\triangle ABC$,

$$\angle ABC + \angle BAC + \angle ACB = 180^\circ$$

$$\angle ABC + 56^\circ + 60^\circ = 180^\circ$$

$$\angle ABC = 180^\circ - 116^\circ$$

$$\angle ABC = 64^\circ$$

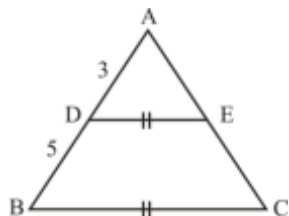
34. In a triangle ABC. Point D and E are on the side AB and AC such that DE is parallel to BC

and $\frac{AD}{BD} = \frac{3}{5}$. If AC = 4cm, then the value of AE is.

- (a) 1.5 cm (b) 2 cm
 (c) 1.8 cm (d) 2.4 cm

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (a) :



From Thales theorem,

$\triangle ABC \sim \triangle ADE$

$$\frac{AD}{AB} = \frac{AE}{AC}$$

$$\frac{3}{8} = \frac{AE}{4}$$

$$AE = \frac{3}{2} = 1.5 \text{ cm}$$

35. In $\triangle ABC$, if $\angle A = 3 \angle B$ and $\angle C = 2 \angle B$, then what are values of $\angle A$, $\angle B$ and $\angle C$?

- (a) $90^\circ, 60^\circ$ and 30° (b) $60^\circ, 30^\circ$ and 90°
 (c) $30^\circ, 90^\circ$ and 60° (d) $90^\circ, 30^\circ$ and 60°

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (d) : $\because \angle A = 3 \angle B$ and $\angle C = 2 \angle B$

\therefore Let $\angle B = x^\circ$, $\angle A = 3x^\circ$ and $\angle C = 2x^\circ$

\therefore Sum of angles of a triangle is 180° .

$$\angle A + \angle B + \angle C = 180^\circ$$

$$3x + x + 2x = 180^\circ$$

$$6x = 180^\circ$$

$$x = \frac{180^\circ}{6} = 30^\circ$$

Hence, $\angle A = 3x = 3 \times 30 = 90^\circ$

$$\angle B = x = 30^\circ$$

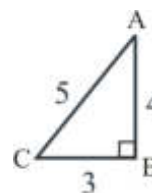
$$\angle C = 2x = 2 \times 30 = 60^\circ$$

36. ABC is a right-angled triangle. If the lengths of two sides containing the right angle are 4 cm and 3 cm. What will be the radius of its incircle.

- (a) 1 cm (b) 2 cm
 (c) 3 cm (d) 4 cm

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (a)



$$\text{Hypotenuse} = \sqrt{4^2 + 3^2} = 5 \text{ cm}$$

\therefore Radius of incircle =

$$\frac{\text{Perpendicular} + \text{Base} - \text{Hypotenuse}}{2}$$

$$= \frac{4 + 3 - 5}{2} = \frac{2}{2} = 1 \text{ cm}$$

37. In triangle ABC, $\angle A$ is 12° more than the measure of $\angle C$. The measure of $\angle B$ is 4 times as great as the measure of $\angle C$. What are the measures of the angles A, B and C respectively?

- (a) $40^\circ, 112^\circ, 18^\circ$ (b) $40^\circ, 120^\circ, 28^\circ$
(c) $35^\circ, 92^\circ, 23^\circ$ (d) $40^\circ, 112^\circ, 28^\circ$

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (d) : $\angle A + \angle B + \angle C = 180^\circ$ (i)

According to the question,

$$\angle A = \angle C + 12^\circ \text{ (ii)}$$

$$\angle B = 4 \times \angle C \text{ (iii)}$$

From equation (i), (ii) and (iii)

$$\angle C + 12^\circ + 4\angle C + \angle C = 180^\circ$$

$$\angle C = 28^\circ$$

$$\angle B = 112^\circ$$

$$\angle A = 40^\circ$$

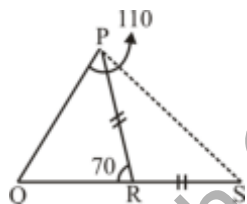
Hence, $\angle A, \angle B$ and $\angle C \Rightarrow 40^\circ, 112^\circ$ and 28°

38. In ΔPQR , QR is extended up to S so that RS = RP. If $\angle PRQ = 70^\circ$ and $\angle QPS = 110^\circ$ then find the measure of $\angle PQS$.

- (a) 55° (b) 50°
(c) 65° (d) 35°

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (d) :



$$\therefore \angle PRQ + \angle PRS = 180^\circ \text{ (Linear pair)}$$

$$\therefore \angle PRS = 180^\circ - 70^\circ = 110^\circ$$

And in ΔPRS ,

$$\therefore PR = RS \text{ (Given)}$$

$$\therefore \angle RSP = \angle RPS \text{ (i)}$$

(The angle opposite to equal side will be equal)

and $\angle PRS + \angle RSP + \angle RPS = 180^\circ$ (The sum of the three interior angles of a triangle is 180° .)

$$\therefore \angle RSP = \angle RPS$$

$$\text{So, } 2\angle RSP = 180^\circ - 110^\circ = 70^\circ (\because \angle PRS = 110^\circ)$$

$$\angle RSP = \frac{70^\circ}{2} = 35^\circ = \angle RPS$$

Again in ΔPQS

$$\begin{aligned} \angle PQS &= 180^\circ - (110^\circ + 35^\circ) \\ &= 180^\circ - 145^\circ = 35^\circ \end{aligned}$$

Hence, $\angle PQS = 35^\circ$

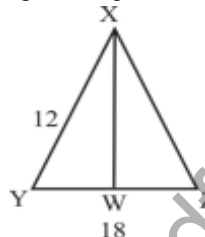
39. In ΔXYZ , $XY = 12$ cm and $YZ = 18$, XW, the angle bisector of $\angle YXZ$, meets YZ at W, such that $YW : WZ$ is 4 : 5.

Find the length of the third side of the triangle.

- (a) 18 cm (b) 14 cm
(c) 15 cm (d) 12 cm

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (c) : According to the question –



\therefore As per the angle bisector theorem, the angle bisector of a triangle bisect the opposite side in such a way that the ratio of the two line-segments is proportional to the ratio of the other two sides.

then, If $XZ = x$ cm

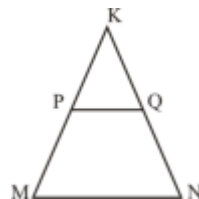
$$\frac{12}{x} = \frac{4}{5}$$

$$4x = 60$$

$$x = 15 \text{ cm.}$$

So, $XZ = 15$ cm.

40. In the given ΔKMN , PQ is parallel to MN. If $\frac{KP}{PM} = \frac{4}{13}$ and $KN = 20.4$ cm, find KQ



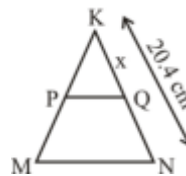
- (a) 3.6 cm (b) 5.1 cm
(c) 8.2 cm (d) 4.8 cm

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) : The parallel line divides the intersecting transversals passing through the parallel line in equal proportion.

$\therefore PQ \parallel MN$ and KM and KN are transversals.

$$\text{then, } \frac{KP}{PM} = \frac{KQ}{QN}$$



$$\frac{4}{13} = \frac{x}{(20.4 - x)}$$

$$4(20.4 - x) = 13x$$

$$81.6 - 4x = 13x$$

$$81.6 = 13x + 4x$$

$$81.6 = 17x$$

$$x = \frac{81.6}{17}$$

$$x = 4.8$$

Hence, KQ = 4.8 cm

41. The angles of a triangle are $2x^\circ$, $(3x^\circ - 8^\circ)$ and $(5x^\circ - 12^\circ)$. The greatest angle of the triangle is:

- (a) 112° (b) 88°
(c) 118° (d) 40°

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (b) : \therefore Sum of three angles of triangle is 180°

$$\therefore 2x^\circ + 3x^\circ - 8^\circ + 5x^\circ - 12^\circ = 180^\circ$$

$$10x^\circ - 20^\circ = 180^\circ$$

$$10x^\circ = 200^\circ$$

$$x = 20^\circ$$

$$\text{First angle} = 2 \times 20^\circ = 40^\circ$$

$$\text{Second angle} = 3 \times 20^\circ - 8 = 52^\circ$$

$$\text{Third angle} = 5 \times 20^\circ - 12 = 88^\circ$$

Hence the greatest angle = 88°

42. If $\triangle ABC$ and $\triangle DEF$ are similar triangles, in which $BC = 4$ cm, $EF = 7$ cm and the area of $\triangle ABC$ is 144 square cm, then find the area of $\triangle DEF$.

- (a) 252 Square cm (b) 504 Square cm
(c) 441 Square cm (d) 324 Square cm

RRB NTPC 02.04.2016 Shift : 1

Ans : (c)



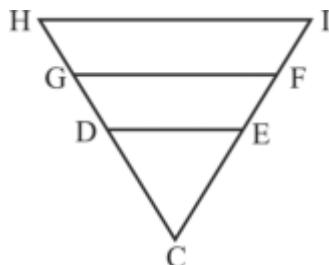
$$\therefore \triangle ABC \sim \triangle DEF$$

$$\therefore \frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \left(\frac{BC}{EF}\right)^2$$

$$\frac{144}{\text{Area of } \triangle DEF} = \left(\frac{4}{7}\right)^2$$

$$\text{Area of } \triangle DEF = \frac{144 \times 49}{16} = 441 \text{ Square cm}$$

43.

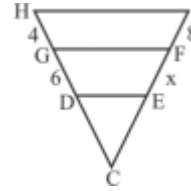


HI, GF and DE are parallel lines, If $DG = 6$, $GH = 4$ and $FI = 8$, then $EF = ?$

- (a) 8 (b) 9
(c) 12 (d) 16

RRB NTPC 31.03.2016 Shift : 1

Ans : (c)



From the Thales theorem

In $\triangle CGF$,

Let $EF = x$

$$\frac{CD}{GD} = \frac{CE}{EF}$$

or $\frac{CD}{CE} = \frac{GD}{EF} \dots \dots \dots (1)$

Again in $\triangle CHI$,

$$\frac{CD}{DH} = \frac{CE}{EI}$$

$$\frac{CD}{CE} = \frac{DH}{EI} \dots \dots \dots (2)$$

\therefore From equation (1) and (2)

$$\frac{GD}{EF} = \frac{DH}{EI}$$

$$\frac{6}{x} = \frac{6+4}{x+8}$$

$$10x = 6x + 48$$

$$4x = 48$$

$$x = 12$$

$$EF = 12$$

44. If the ratio of the angles of a triangle is 1:2:3, find the value of the largest angle?

- (a) 30° (b) 60°
(c) 90° (d) 120°

RRB NTPC 19.04.2016 Shift : 1

Ans : (c) If the angles of triangle are x , $2x$ and $3x$ respectively.

$$\text{Then } x + 2x + 3x = 180^\circ$$

$$6x = 180^\circ$$

$$x = 30^\circ$$

$$\therefore \text{Largest angle} = 3x = 3 \times 30 = 90^\circ$$

45. Two sides of triangle are of lengths 4 cm and 10 cm. If the length of the third side is a cm then

- (a) $6 < a < 14$ (b) $a > 5$
(c) $a < 6$ (d) $6 < a < 12$

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (a) : We know that the measure of any side of any triangle is less than the sum of the other two sides and greater than the difference.

$$\therefore (10-4) < a < (10+4) \\ 6 < a < 14$$

46. The area of an isosceles right angle triangle is 81 cm^2 . Find the length of its hypotenuse.

- (a) 18 cm (b) 22 cm
(c) 16 cm (d) 14 cm

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (a) : Let the length of sides of an isosceles right angle triangle is $x \text{ cm}$.

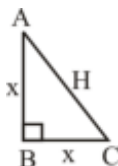
According to the question—

$$\text{Area of triangle} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$81 = \frac{1}{2} \times x \times x$$

$$x^2 = 81 \times 2$$

$$x = 9\sqrt{2}$$



Then, $H = x\sqrt{2}$

$$= 9\sqrt{2} \times \sqrt{2} = 18 \text{ cm.}$$

47. The sides of triangle are positive integers if the measures of two sides are 6 cm and 3 cm, then find the possible number of such distinct triangles:

- (a) 3 (b) 9
(c) 7 (d) 5

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (d) :



In any triangle $\rightarrow |b-c| < a < |b+c|$

So in ΔABC , $|AB - AC| < BC < AB + AC$

$$|6-3| < BC < |6+3|$$

$$3 < BC < 9$$

$\therefore BC$ is a positive integer, so all possible value of $BC = 4, 5, 6, 7, 8$

Hence, total number of triangles will be 5.

48. The area of two similar triangles are 121 m^2 and 64 m^2 . If the median of the first triangle is 12.1 m then the median of the second triangle is:

- (a) 6.4 m (b) 8.4 m
(c) 8.8 m (d) 9.2 m

RRB NTPC 19.01.2017 Shift : 2

Ans : (c)

$$\frac{M_1}{M_2} = \sqrt{\frac{A_1}{A_2}} \quad \frac{12.1}{M_2} = \sqrt{\frac{(121)}{(64)}}$$

$$\frac{12.1}{M_2} = \frac{11}{8}, \quad M_2 = 8.8 \text{ m.}$$

Type - 3

Problems Based on Quadrilateral

49. If the angles of a quadrilateral are in the ratio of 4 : 9 : 11 : 12, then the largest of these angles is:

- (a) 166° (b) 168°
(c) 120° (d) 72°

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the angle of the quadrilateral be $4x, 9x, 11x$ and $12x$ respectively.

Sum of the angles of the quadrilateral = 360°

$$4x + 9x + 11x + 12x = 360^\circ$$

$$36x = 360^\circ$$

$$x = 10$$

Hence the greatest angle of quadrilateral = $12x = 12 \times 10 = 120^\circ$

50. The sum of the angles of a quadrilateral is ____.

- (a) 180° (b) 270°
(c) 90° (d) 360°

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (d) : The sum of all the angles of any quadrilateral is 360° .

51. The angles of a quadrilateral are in the ratio of 5:8:10:13. The smallest of these angles is:

- (a) 45° (b) 35°
(c) 55° (d) 50°

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : \therefore Sum of all angles of a quadrilateral = 360°

Let the angle of the quadrilateral be $5x, 8x, 10x, 13x$ respectively.

$$5x + 8x + 10x + 13x = 360^\circ$$

$$36x = 360^\circ$$

$$x = 10$$

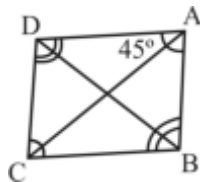
So the smallest angle = $5x = 5 \times 10 = 50^\circ$

52. The diagonals of a quadrilateral ABCD bisect each other. In this quadrilateral, if $\angle A = 45^\circ$ then $\angle B = ?$

- (a) 120° (b) 135°
(c) 125° (d) 115°

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (b) :



As the diagonals divided equally, hence ABCD is a parallelogram

$$\angle A + \angle B = 180^\circ$$

$$45^\circ + \angle B = 180^\circ$$

$$\angle B = 180^\circ - 45^\circ = 135^\circ$$

Type - 4 Problems Based on Rhombus

53. The adjacent angles of a rhombus are in the ratio of 3 : 6. The smallest angle of the rhombus is:

- (a) 40° (b) 120°
(c) 60° (d) 80°

RRB NTPC 28.12.2020 (Shift-I) Stage Ist

Ans. (c) : Let adjacent angles of rhombus be $3x^\circ$ & $6x^\circ$
Now, sum of adjacent angles of Rhombus = 180°

$$\therefore 3x^\circ + 6x^\circ = 180^\circ$$

$$9x^\circ = 180^\circ$$

$$x^\circ = 20^\circ$$

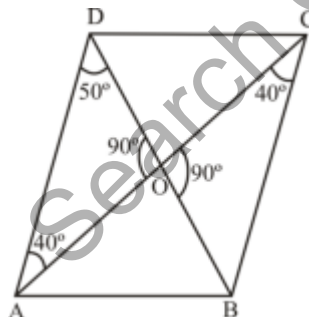
The smallest angle = $3 \times 20 = 60^\circ$

54. In a rhombus ABCD, if $\angle ACB = 40^\circ$, then $\angle ADB = ?$

- (a) 50° (b) 70°
(c) 60° (d) 45°

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

Ans. (a) :



The diagonals of rhombus bisect each other at right angle (90°).

$$\angle AOD = 90^\circ$$

$\angle ACB = \angle DAO = 40^\circ$ [Transversal line AC cuts $AD \parallel BC$]

In $\triangle DAO$

$$\angle AOD + \angle OAD + \angle ADO = 180^\circ$$

$$90^\circ + 40^\circ + \angle ADO = 180^\circ$$

$$\angle ADO = 180^\circ - 130^\circ$$

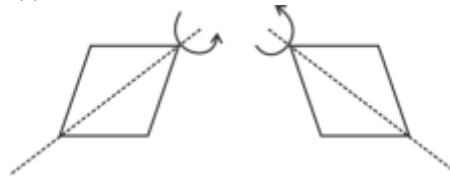
$$\angle ADB = 50^\circ \{ \because \angle ADO = \angle ADB \}$$

55. The order of rotational symmetry of a rhombus is—

- (a) 1 (b) 4
(c) 2 (d) 0

RRB NTPC 22.04.2016 Shift : 2

Ans : (c)



Hence the rotational symmetry will be 2.

Type - 5 Problems Based on Parallelogram

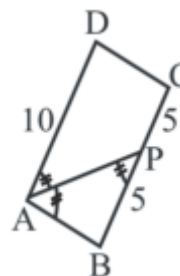
56. P is the mid-point of side BC of a parallelogram ABCD such that $\angle BAP = \angle DAP$. If $AD = 10$ cm, then $CD = ?$

- (a) 5 cm (b) 6 cm
(c) 10 cm (d) 8 cm

RRB NTPC 15.02.2021 (Shift-II) Stage Ist

$$\text{Ans. (a) : } BP = PC = \frac{AD}{2} = \frac{10}{2} = 5$$

$\angle BAP = \angle DAP$ (Given)



$\angle DAP = \angle BPA$ ($AD \parallel BC$, alternate angle)

Hence $\angle BAP = \angle BPA$

$AB = BP$ (If two angles of a triangle are equal then sides opposite to them are also equal)

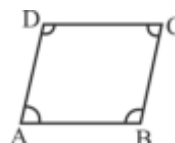
Hence $AB = CD = 5$ cm

57. If one angle of a parallelogram is 28° less than thrice the smallest angle, then the largest angle of the parallelogram is:

- (a) 122° (b) 126°
(c) 128° (d) 124°

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (c) $\because \angle A + \angle B + \angle C + \angle D = 360^\circ$



Let the smallest angle of the parallelogram be x.

According to the question, one angle must be -
 $= 3x - 28^\circ$

$$\therefore \angle A = \angle C \text{ And } \angle B = \angle D$$

$$\text{So, } x + x + 3x - 28^\circ + 3x - 28^\circ = 360^\circ$$

$$8x = 360^\circ + 56^\circ$$

$$x = 52^\circ$$

Hence, the greatest angle of a parallelogram $= 3 \times 52 - 28^\circ = 128^\circ$

58. In the parallelogram ABCD, AL and CM are perpendicular to CD and AD respectively. AL = 20 cm, CD = 18 cm and CM = 15 cm. The perimeter of the parallelogram is:

- (a) 84 cm (b) 80 cm
 (c) 64 cm (d) 76 cm

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (a) : Given,

In the parallelogram ABCD,

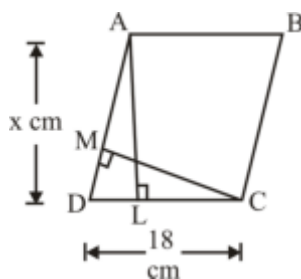
$$AL \perp CD$$

And $CM \perp AD$

$$AL = 20 \text{ cm}$$

$$CD = 18 \text{ cm}$$

$$CM = 15 \text{ cm}$$



In a parallelogram, the opposite sides are equal.

$$AD = BC$$

and $AB = CD$

Area of parallelogram = Base \times Height

$$AD \times CM = CD \times AL$$

$$x \times 15 = 18 \times 20$$

$$x = 24 \text{ cm}$$

Perimeter of the parallelogram

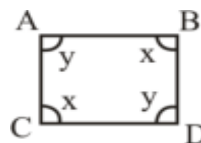
$$\begin{aligned} (ABCD) &= AB + BC + CD + AD \\ &= 2(AD + CD) \\ &= 2(24 + 18) \\ &= 2 \times 42 \\ &= 84 \text{ cm} \end{aligned}$$

59. If one angle of a parallelogram is 39° less than twice the smallest angle, then the smallest angle of the parallelogram is:

- (a) 72° (b) 75°
 (c) 74° (d) 73°

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (d) : The opposite angles of a parallelogram are equal.



$$\angle ACD = \angle ABD = x$$

$$\angle BAC = \angle BDC = y$$

Then, According to the question,

Let the smallest angle is x

$$y = 2x - 39^\circ \dots\dots\dots(i)$$

By quadrilateral rule-

$$x + y + x + y = 360^\circ$$

$$2x + 2y = 360^\circ$$

$$2(x + y) = 360^\circ$$

$$x + y = 180^\circ \dots\dots\dots(ii)$$

On putting the value of y from eqⁿ (i) to eqⁿ (ii)

$$x + (2x - 39^\circ) = 180^\circ$$

$$3x = 180^\circ + 39^\circ$$

$$x = \frac{219^\circ}{3} = 73^\circ$$

Hence the smallest angle of parallelogram (x) = 73°

60. If one angle of a parallelogram is 48° less than twice the smallest angle, then the measure of the largest angle of the parallelogram will be.

- (a) 128° (b) 140°
 (c) 120° (d) 104°

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : Let the smallest and the largest angle of parallelogram be x and y respectively.

$$\text{Then } x + y = 180^\circ \dots(i)$$

As per the question

$$2x - 48 = y$$

On putting the value of $y = 180^\circ - x$ (from equation (i))

$$2x - 48^\circ = 180^\circ - x$$

$$3x = 180^\circ + 48^\circ = 228^\circ$$

$$x = \frac{228^\circ}{3} = 76^\circ$$

Hence, the largest angle (y) = $180^\circ - 76^\circ = 104^\circ$

61. The Sum of the consecutive angles of a parallelogram is equal to:

- (a) 90° (b) 120°
 (c) 180° (d) 360°

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (c) : The sum of consecutive angles of a parallelogram is equal to 180° .

62. ABCD is a parallelogram in which $\angle A = x + 20^\circ$ and $\angle C = 3x - 10^\circ$. The value of x is _____.

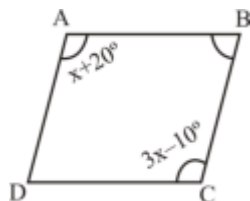
- (a) 40° (b) 30°
 (c) 15° (d) 60°

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (c) : The opposite angles of a parallelogram are equal i.e.

$$\angle A = \angle C$$

$$\angle B = \angle D$$



$$x + 20^\circ = 3x - 10^\circ$$

$$2x = 30^\circ$$

$$x = 15^\circ$$

63. The sides of a parallelogram are $3x + 2$ and $5x + 4$. It has a perimeter of 44 cm and an area of 64 cm^2 . The value of the acute angle between its sides in degrees is:

- Between 60° and 75°
- Less than 30°
- Between 30° and 60°
- Greater than 75°

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

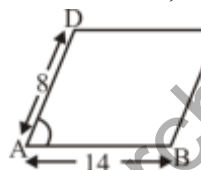
Ans. (c) : Perimeter of parallelogram = $2(3x+2) + 2(5x+4)$

$$\Rightarrow 16x + 12 = 44$$

$$16x = 32$$

$$x = 2$$

Hence the adjacent sides = $3x + 2$, $5x + 4$
= 8 cm, 14 cm



Given that the area of parallelogram = 64 cm^2

$$ab \sin \theta = 64$$

$$8 \times 14 \sin \theta = 64$$

$$\sin \theta = \frac{4}{7} = 0.571$$

$$\sin 30^\circ = \frac{1}{2} < \sin \theta = \frac{4}{7} < \sin 60^\circ = \frac{\sqrt{3}}{2}$$

Acute angle = $30^\circ < \theta < 60^\circ$

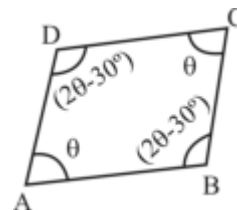
Hence, option (c) will be true.

64. If one angle of a parallelogram is 30° less than twice the measure of the smallest angle, then the measure of the largest angle of the parallelogram is

- 120°
- 110°
- 105°
- 90°

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (b)



Let the smallest angle of parallelogram = θ

Then the largest angle = $2\theta - 30^\circ$

Hence, in the parallelogram

$$\theta + 2\theta - 30^\circ = 180^\circ$$

$$3\theta = 210^\circ$$

$$\theta = 70^\circ$$

Value of the largest angle = $2\theta - 30^\circ = 2 \times 70^\circ - 30^\circ$
= 110°

Type - 6 Problems Based on Trapezium

65. An object is in the form of a trapezium with height 5 m and parallel sides being 4 m and 6 m. What is the cost of painting the object if the rate of painting is ₹50 per square meter.

- ₹1,200
- ₹1,000
- ₹800
- ₹1,250

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (d) :

Area of trapezium = $\frac{1}{2} \times \text{Sum of parallel sides} \times \text{Height}$

$$= \frac{1}{2} \times (4+6) \times 5 = 25 \text{ m}^2.$$

Total outlay in painting = 25×50
= ₹ 1250

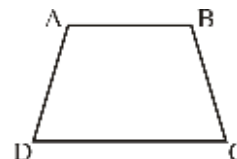
66. Trapezium is a quadrilateral whose:

- All sides are equal.
- Opposite sides are equal.
- Two pairs of parallel opposite sides are.
- One pair of parallel opposite sides is.

RRB NTPC 28.03.2016 Shift : 3

Ans : (d) Trapezium is a quadrilateral with a pair of parallel opposite sides.

$AB \parallel DC$



67. The order of rotational symmetry of a trapezium is.

- 2
- 0
- 1
- 3

RRB NTPC 11.04.2016 Shift : 2

Ans : (c) The rotational symmetry of a trapezium is one order.

Note : If a shape is partially rotated, If the shape looks the same even after rotating, then this property is called rotatory symmetry.

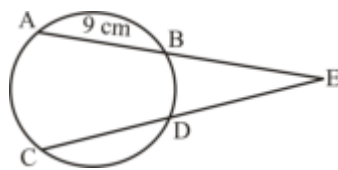
Type - 7 Problems Based on Circle

68. In a circle AB and CD are produced to meet at E outside the circle. If AB = 9 cm and AE = 12 cm and ED = 4 cm, then what is the length of the chord CD?

- (a) 5.5 cm (b) 4 cm
(c) 5 cm (d) 4.5 cm

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (c) : Given,
AB = 9 cm, AE = 12 cm.
ED = 4 cm.



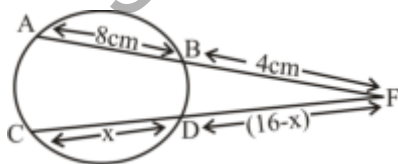
$$\begin{aligned}\therefore BE &= AE - AB \\ &= 12 - 9 = 3 \text{ cm.} \\ \therefore BE \times AE &= ED \times CE \\ 3 \times 12 &= 4 \times CE \\ CE &= 9 \text{ cm} \\ \therefore CD &= CE - ED \\ &= 9 - 4 \\ &= 5 \text{ cm.}\end{aligned}$$

69. Two chords AB and CD of a circle intersect at a point F outside the circle. If AF = 12 cm, BF = 4 cm and CF = 16 cm, find the length of CD.

- (a) 13 cm (b) 12 cm
(c) 11 cm (d) 10 cm

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (a) :



By theorem,
If two chords AB and CD of a circle are intersect at a point F to outside the circle then,

$$\begin{aligned}AF \times BF &= CF \times DF \\ 12 \times 4 &= 16 \times (16 - x) \\ 3 &= 16 - x \\ x &= 13 \text{ cm}\end{aligned}$$

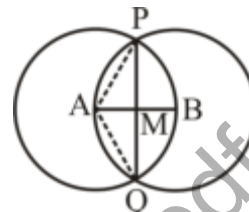
Hence, length of CD = 13 cm.

70. Two equal circles, each having a radius of 24 cm, intersect each other, such that each passes through the center of the other. The length of the common chord is ____ cm.

- (a) $36\sqrt{3}$ (b) $24\sqrt{3}$
(c) $36\sqrt{2}$ (d) $30\sqrt{3}$

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (b) :



In $\triangle PAM$,

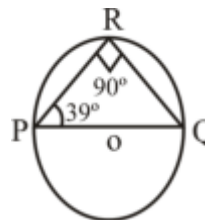
$$\begin{aligned}AP^2 &= PM^2 + AM^2 \\ (24)^2 &= PM^2 + (12)^2 \\ PM^2 &= 24^2 - 12^2 \\ PM &= 12\sqrt{3} \text{ cm} \\ \therefore PQ &= 24\sqrt{3} \text{ cm}\end{aligned}$$

71. PQ is the diameter of a circle whose center is O. If a point R lies on the circle and $\angle RPO$ is 39° , then what will be the measure of $\angle RQP$?

- (a) 125° (b) 51°
(c) 129° (d) 151°

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (b) : We know that the angle formed in a semi circle is a right angle.



$$\begin{aligned}\text{So, } \angle PRQ &= 90^\circ \\ \text{Then, } \angle PRQ + \angle RPQ + \angle RQP &= 180^\circ \\ 90^\circ + 39^\circ + \angle RQP &= 180^\circ \\ \angle RQP &= 180^\circ - 129^\circ \\ \text{So, } \angle RQP &= 51^\circ\end{aligned}$$

72. The lengths of the two shorter sides of a right triangle 24 cm & 7 cm. Find the radius of circumcircle of the triangle.

- (a) 12.5 cm (b) 12 cm
(c) 16 cm (d) 15.5 cm

RRB NTPC 26.07.2021 (Shift-II) Stage Ist

Ans. (a) : Given-

The lengths of the two shorter sides of a right angle triangle are 7 cm and 24 cm respectively.

∴ The hypotenuse is the longest side of a right angled triangle.

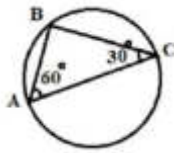
$$\therefore \text{Hypotenuse} = \sqrt{(24)^2 + (7)^2} = \sqrt{576 + 49} = \sqrt{625}$$

$$\text{Hypotenuse} = 25 \text{ cm}$$

∴ Radius of the circumcircle of right angled triangle

$$= \frac{\text{Hypotenuse}}{2} = \frac{25}{2} = 12.5 \text{ cm}$$

73. In the given picture, A, B and C are three points on a circle. If AB = 3 cm and BC = 4 cm then find the measure of the radius of the circle.



- (a) 5 cm (b) $\frac{5}{2}$ cm
(c) $\frac{7}{2}$ cm (d) 3 cm

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (b) : ΔABC is a right angled triangle.

Given - AB = 3cm

BC = 4cm

From Pythagoras theorem-

$$AC^2 = AB^2 + CB^2$$

$$AC^2 = 3^2 + 4^2$$

$$AC^2 = 9 + 16$$

$$AC^2 = 25$$

$$AC = 5$$

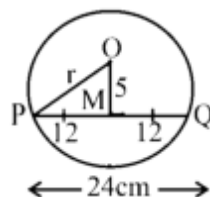
$$\text{Hence radius of the circle} = \frac{AC}{2} = \frac{5}{2} \text{ cm}$$

74. A chord of length 24 cm is at a distance of 5 cm from the centre of a circle. The radius of the circle is ____ cm.

- (a) 13 (b) 10
(c) 12 (d) 14

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (a) :



In the right angled triangle PMO from Pythagoras theorem,

$$PM^2 + OM^2 = OP^2$$

$$(12)^2 + (5)^2 = r^2$$

$$144 + 25 = r^2$$

$$r^2 = 169$$

$$r = 13 \text{ cm}$$

75. Point A, B and C lie on a circle with centre O. If $\angle ACB = 46.5^\circ$ then find the measure of the $\angle AOB$ on the minor \widehat{AB} .

- (a) 90° (b) 93°
(c) 94° (d) 92°

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

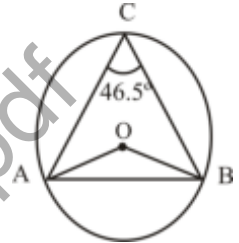
Ans. (b) : According to the question-

$$\angle AOB = 2 \times \angle ACB$$

∴ The angle at the centre is twice of the angle at the circumference subtended in same segment.

$$\therefore \angle AOB = 2 \times 46.5$$

$$\angle AOB = 93^\circ$$

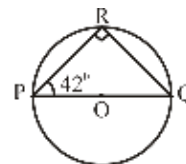


76. PQ is a diameter of circle whose centre is O. If a point R lies on a circle and $\angle RPO$ is 42° , then find $\angle RQP$.

- (a) 48° (b) 39°
(c) 25° (d) 51°

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,



Given, $\angle RPO = 42^\circ$

∴ Angle subtended in a semicircle is a right angle.

Hence, $\angle PRQ = 90^\circ$

In Δ PQR,

$$\angle PRQ + \angle RQP + \angle QPR = 180^\circ$$

$$90^\circ + \angle RQP + 42^\circ = 180^\circ$$

$$\angle RQP = 180^\circ - 132^\circ$$

$$\therefore \angle RQP = 48^\circ$$

77. The radius of the circle in which a central angle of 60° intercepts an arc of length 35 cm is:

- (a) 35π cm (b) $\frac{35}{\pi}$ cm
(c) $\frac{105}{\pi}$ cm (d) $\frac{100}{\pi}$ cm

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : Length of arc = 35 cm

$$\theta = 60^\circ = \frac{\pi}{180} \times 60 = \left(\frac{\pi}{3}\right)^\circ$$

$$\theta = \frac{l}{r}$$

$$\frac{\pi}{3} = \frac{35}{r}$$

$$r = \frac{105}{\pi} \text{ cm}$$

78. Find the degree measure of an angle subtended at the centre of a circle of radius 28 cm by an arc of length 22 cm.

- (a) 55° (b) 40°
(c) 45° (d) 50°

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (c) : $\ell = 2\pi r \times \frac{\theta}{360^\circ}$

$$22 = 2 \times \frac{22}{7} \times 28 \times \frac{\theta}{360^\circ}$$

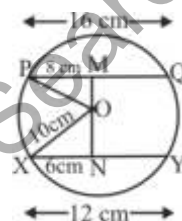
$$\theta = \frac{360^\circ}{8} = 45^\circ$$

79. A circle of radius 10 cm has XY and PQ parallel chords of 12 cm and 16 cm each. Both the chords are at opposite from centre. Find the distance between chords ?

- (a) 18 cm (b) 12.8 cm
(c) 12 cm (d) 14 cm

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (d) : Let the distance between chords be MN.



From Pythagoras theorem –

$$ON^2 = 10^2 - 6^2$$

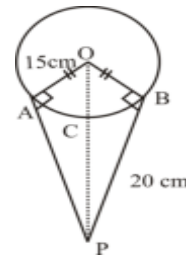
$$ON = 8 \text{ cm}$$

$$OM^2 = 10^2 - 8^2$$

$$OM = 6 \text{ cm}$$

$$MN = ON + OM = 8 + 6 = 14 \text{ cm}$$

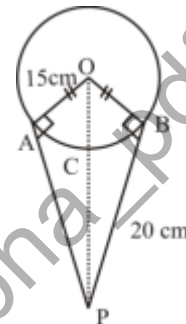
80. In the given figure, if PB = 20 cm and OA = 15 cm, then find the shortest distance between the circle and P



- (a) 15 cm (b) 25 cm
(c) 20 cm (d) 10 cm

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (d) :



OC = OA = OB = 15 cm (radius of same circle)

In right angled triangle POB

$$OB^2 + PB^2 = OP^2 \quad (\text{Pythagoras theorem})$$

$$(15)^2 + (20)^2 = OP^2$$

$$OP^2 = 225 + 400 = 625$$

$$OP^2 = (25)^2$$

$$OP = 25$$

Minimum distance between point P and C in circle

$$(PC) = OP - OC$$

$$= 25 - 15$$

$$= 10 \text{ cm}$$

81. The angle of a sector is 30° . If its radius is 42 cm, then the length of the arc of the sector is

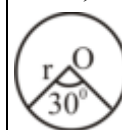
- (a) 32 cm (b) 20 cm
(c) 22 m (d) 22 cm

RRB NTPC 26.07.2021 (Shift-I) Stage Ist

Ans. (d) :

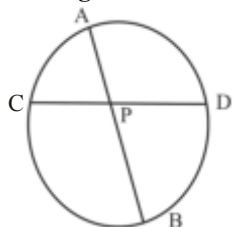
$$\text{Length of arc} = \frac{\text{Angle made by radius at centre}}{360^\circ} \times 2\pi r$$

Where, r = radius of the circle.



$$\text{Now, length of arc} = \frac{30^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 42 = 22 \text{ cm.}$$

82. In the given circle, chords AB and CD intersect internally at P. If $\overline{CP} = 3\text{ cm}$ and $\overline{DP} = 8\text{ cm}$ and the numerical values of the lengths of \overline{AP} and \overline{BP} are both natural numbers, then which of the following options cannot be the length of \overline{AB} ?



- (a) 14 cm (b) 25 cm
(c) 10 cm (d) 20 cm

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (d) : Given-

$CP = 3\text{ cm}$, $DP = 8\text{ cm}$

Let $AP = x\text{ cm}$ and $BP = y\text{ cm}$

$AP \times BP = CP \times DP$

$x \times y = 3 \times 8$

$x \times y = 24$

(I) On taking $x = 24$, $y = 1$

$x + y = 24 + 1 = 25$

(II) On taking $x = 6$, $y = 4$

$x + y = 6 + 4 = 10$

(III) On taking $x = 12$, $y = 2$

$x + y = 12 + 2 = 14$

Therefore length of AB can't be 20 cm.

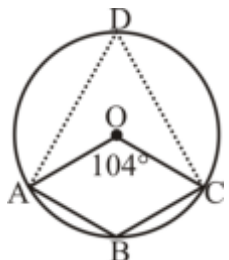
83. In the given circle with center O, the obtuse angle at the center measures 104° . In the quadrilateral drawn inside the circle, what is the measure of the angle opposite to $\angle O$? (Figure is not drawn to scale).



- (a) 124° (b) 132°
(c) 128° (d) 152°

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (c) : Given-



$\angle AOC = 104^\circ$
 $\angle ADC = \frac{104^\circ}{2} = 52^\circ$ (The angle subtended by the same arc at the center is twice the angle at the circumference)

According to the question-

In cyclic $\square ABCD$ -

$\angle ADC + \angle ABC = 180^\circ$ (The sum of opposite angles of cyclic quadrilateral is 180°)

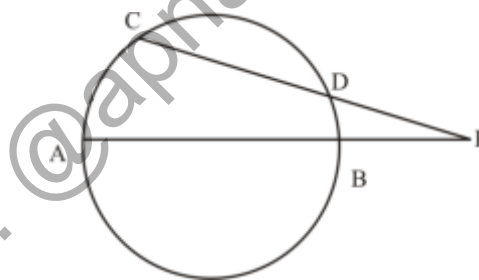
$$52^\circ + \angle ABC = 180^\circ$$

$$\angle ABC = 180^\circ - 52^\circ$$

$$\angle ABC = 128^\circ$$

Therefore, the value of angle opposite to $\angle O$ will be 128° .

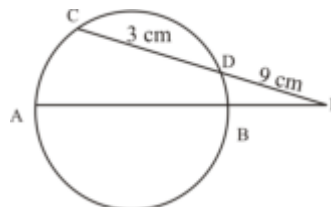
84. In the given circle, diameter AB is extended to meet chord CD extended at P. If the lengths of the line segment AP, CD and DP are 18 cm, 3 cm and 9 cm, respectively, what is the length of the radius of the circle?



- (a) 3 cm (b) 9 cm
(c) 12 cm (d) 6 cm

RRB NTPC 23.07.2021 (Shift-I) Stage Ist

Ans. (d) : Given-



$AP = 18\text{ cm}$, $CD = 3\text{ cm}$.

$DP = 9\text{ cm}$.

Let $AB = x\text{ cm}$. (diameter)

$BP = (18 - x)\text{ cm}$.

According to the question-

$DP \times CP = BP \times AP$

$$9 \times 12 = (18 - x) \times 18$$

$$(18 - x) = 6$$

$$x = 12\text{ cm}.$$

$$\text{Radius} = \frac{\text{diameter}}{2}$$

$$\text{Radius} = \frac{AB}{2} = \frac{12}{2} = 6\text{ cm}.$$

85. A sector of a circle has a radius of 18 cm and a central angle of 125° . What will be its approximate perimeter?

(Use $\pi = \frac{22}{7}$)

- (a) 75.3 cm (b) 73.85 cm
(c) 74 cm (d) 73 cm

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,



Given that,
 $r = 18\text{ cm}$

$$\begin{aligned}\text{Perimeter of sector of a circle} &= \frac{\theta}{360^\circ} \times 2\pi r + 2r \\ &= \frac{125^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 18 + 2 \times 18 \\ &= \frac{275}{7} + 36 \\ &= \frac{527}{7} = 75.28 \\ &\approx 75.3\text{ cm}\end{aligned}$$

86. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm.

- (a) $62^\circ 36'$ (b) $22^\circ 36'$
(c) $2^\circ 36'$ (d) $12^\circ 36'$

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (d) : We know that in a circle of radius r unit. If an arc of ℓ unit subtends an angle θ radian at the centre,

then $\theta = \frac{\ell}{r} \left[\text{Angle} = \frac{\text{Arc}}{\text{radius}} \right]$

Here $r = 100\text{ cm}$ and $\ell = 22\text{ cm}$

$$\begin{aligned}\therefore \theta &= \frac{22}{100} \text{ Radian} \\ \theta &= \frac{22}{100} \times \frac{180}{\pi} \text{ Degree} \\ \theta &= \frac{22 \times 180 \times 7}{22 \times 100} \\ \theta &= 12\frac{3}{5} \text{ Degree}\end{aligned}$$

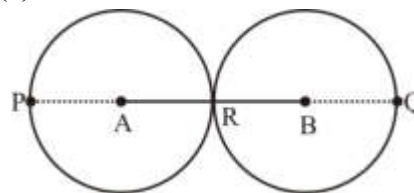
$\boxed{\theta = 12^\circ 36'} \quad [1^\circ = 60']$

87. The radius of circle A and circle B is 4 units. If the point P is located on A and the point Q is located on B, and Both circle touch each other exactly at a point. Then what will be the maximum length of PQ.

- (a) 0 (b) 4
(c) 8 (d) 16

RRB NTPC 30.03.2016 Shift : 2

Ans : (d)



Circle A and circle B touch at a point R in the figure then,

$AR = BR = 4\text{ unit}$ (radius of circle)

PR and QR is diameter of circle A and circle B.

Then $PR = QR = 2AR$

$$PR = QR = 2 \times 4 = 8\text{ unit}$$

Or maximum length of $PQ = 2 \times PR = 2 \times 8 = 16\text{ unit}$

88. If a circle is divided into 6 equal parts. What will be the measure of each angle?

- (a) 45 (b) 60
(c) 30 (d) 90

RRB NTPC 28.04.2016 Shift : 1

Ans : (b)

\therefore Angle formed by all 6 sides on the center of circle $= 360^\circ$



\therefore According to the question

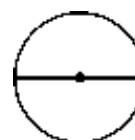
$$= \frac{360^\circ}{6} = 60^\circ$$

89. The largest chord of a circle is.

- (a) Radius (b) Diameter
(c) Line segment (d) Sector

RRB NTPC 29.04.2016 Shift : 2

Ans : (b) Largest chord of circle is "diameter" which passes through the center of the circle.

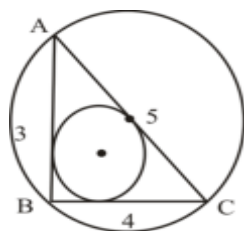


90. Circles are inscribed and circumscribed to a triangle whose sides are 3 cm, 4 cm and 5 cm. What is the ratio of radius of the incircle to that of the circumcircle?

- (a) 1 : 5 (b) 2 : 5
(c) 3 : 5 (d) 5 : 2

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question,



$AB = 3\text{cm}$, $BC = 4\text{cm}$, $AC = 5\text{cm}$

From Pythagoras theorem–

$$AC^2 = AB^2 + BC^2$$

$$5^2 = 3^2 + 4^2$$

$$25 = 9 + 16$$

$$25 = 25$$

Hence, the given triangle is a right angled triangle.

radius of incircle–

$$r = \frac{AB + BC - CA}{2} = \frac{3 + 4 - 5}{2} = 1$$

$$\text{Radius of circumcircle (R)} = \frac{AC}{2} = \frac{5}{2}$$

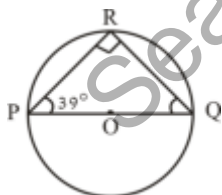
Hence, ratio of radius of both circles = $1 : \frac{5}{2} = 2 : 5$

91. PQ is a diameter of a circle whose centre is O. If a point R lies on the circle and $\angle RPO$ is 39° , then find the measure of $\angle RQP$.

- (a) 51° (b) 125°
(c) 129° (d) 151°

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (a) :



\therefore PQ is the diameter of circle

But the angle subtended in a semicircle is a right angle.

$$\therefore \angle PRQ = 90^\circ$$

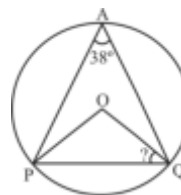
In ΔRPQ –

$$\angle RPQ + \angle PRQ + \angle PQR = 180^\circ$$

$$39^\circ + 90^\circ + \angle PQR = 180^\circ$$

$$\angle PQR = 180^\circ - 129^\circ = 51^\circ$$

92. In the given figure, PO and OQ are the radius of the circumcircle of the triangle APQ. If $\angle PAQ = 38^\circ$, then what will be the $\angle PQO$?



- (a) 52° (b) 76°
(c) 112° (d) 104°

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (a) :



Given,

$$\angle PAQ = 38^\circ$$

In triangle POQ = OP = OQ, $\angle PQO = \angle QPO$

$$\therefore \angle POQ = 2 \times \angle PAQ \quad \{\because \text{From theorem}\}$$

$$\angle POQ = 2 \times 38^\circ$$

$$\angle POQ = 76^\circ$$

In ΔPOQ ,

$$\angle PQO + \angle QPO + \angle POQ = 180^\circ$$

$$2\angle PQO + 76^\circ = 180^\circ$$

$$\angle PQO = 52^\circ$$

93. ABC is an equilateral triangle and O is its circumcentre. If the side of triangle is 6 cm, then the $\angle BOC$ is:

- (a) 36° (b) 60°
(c) 120° (d) 30°

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,



\therefore Each angle in equilateral triangle is 60° .

\therefore We know that, the angle subtended by an arc of a circle on the circumference of a circle is half of the angle subtended at the centre.

$$\therefore \angle BOC = 2 \times \angle BAC$$

$$\angle BOC = 2 \times 60^\circ$$

$$\therefore \angle BOC = 120^\circ$$

94. A circle of radius 7 cm circumscribed an equilateral triangle. The length of the side of the equilateral triangle is:

- (a) $7\sqrt{2}$ cm (b) 7 cm
(c) $7\sqrt{3}$ cm (d) $5\sqrt{3}$ cm

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (c) :



Let side of equilateral triangle = a cm
then circumradius of equilateral triangle = $\frac{a}{\sqrt{3}}$
So, $\frac{a}{\sqrt{3}} = 7$ (Radius of circumcircle 7 cm.)
 $a = 7\sqrt{3}$
Hence, the length of equilateral triangle (a) = $7\sqrt{3}$ cm.

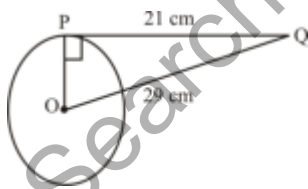
Type - 8 Problems Based on Tangent to Circle

95. From a point Q, the length of the tangent to a circle is 21 cm and the distance of Q from the centre 'O' of the circle is 29 cm. Find the radius of the circle.

- (a) 20 cm (b) 8 cm
(c) 50 cm (d) 30 cm

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (a) : According to the question,



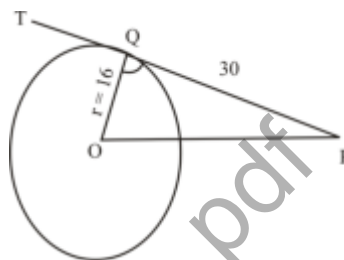
Given,
 $PQ = 21$ cm
 $OQ = 29$ cm
 $OP = ?$
 $OP = \sqrt{(OQ)^2 - (PQ)^2}$
 $= \sqrt{(29)^2 - (21)^2}$
 $= \sqrt{841 - 441}$
 $= \sqrt{400}$
 $= 20$ cm
Hence, the radius of the circle
(OP) = 20 cm

96. PT is a tangent drawn from P, given outside the circle, with center O touching the circle at Q. If $PQ = 30$ cm and the diameter of the circle is 32 cm, then what is the length of OP?

- (a) 36 cm (b) 34 cm
(c) 32 cm (d) 38 cm

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

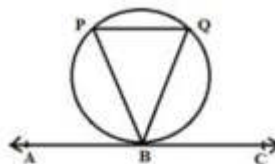
Ans. (b) : Diameter (d) = 32 cm, $r = \frac{32}{2} = 16$ cm



From Pythagoras theorem,

$$\begin{aligned}(OP)^2 &= (PQ)^2 + (OQ)^2 \\ &= (30)^2 + (16)^2 = 900 + 256 \\ (OP)^2 &= 1156 \quad \boxed{OP = 34 \text{ cm}}\end{aligned}$$

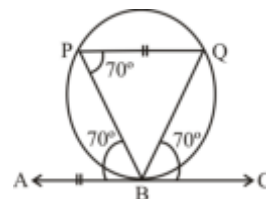
97. Line ABC is a tangent to a circle at B. If $PQ \parallel AC$ and $\angle QBC = 70^\circ$, $\angle PBQ$ is = ?



- (a) 70° (b) 110°
(c) 40° (d) 20°

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (c) :



The angle between the chord and the tangent is equal to the angle in the alternate segment.

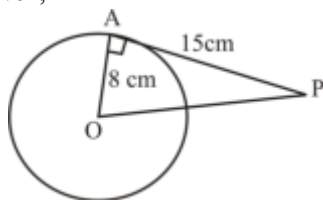
$\therefore \angle QBC = \angle BPQ$
 $70^\circ = \angle BPQ$
 $\angle BPQ = 70^\circ$
Hence, $\angle BPQ = \angle PBA = 70^\circ$
 $\therefore \angle PBQ = 180^\circ - \{\angle PBA + \angle QBC\}$
 $= 180^\circ - \{70^\circ + 70^\circ\}$
 $= 180^\circ - 140^\circ = 40^\circ$

98. If a tangent to a circle from a point P meets the circle at A with AP = 15 cm. Given that the radius of the circle is 8 cm, find the distance of point P from the centre of the circle.

- (a) 15 cm (b) 20 cm
(c) 17 cm (d) 12 cm

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,



$$\therefore AP = 15 \text{ cm}$$

$$OA = 8 \text{ cm}$$

\therefore The radius of any circle is perpendicular to the tangent to that circle.

Hence, angle A in $\triangle OAP$ will be a right angle triangle.

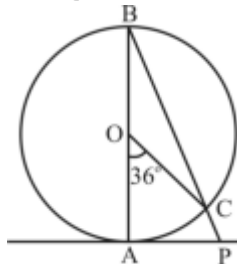
Then, from the Pythagoras theorem,

$$OP = \sqrt{(15)^2 + 8^2} = \sqrt{225 + 64}$$

$$OP = \sqrt{289}$$

$$OP = 17 \text{ cm}$$

99. In the given figure, AB is the diameter of the circle. AP is a tangent to circle at A. Extended BC meets the tangent at P. $\angle AOC = 36^\circ$. Find $\angle BPQ$.



- (a) 72° (b) 126°
(c) 108° (d) 54°

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : From the given figure-

$\angle ABC = \frac{1}{2} \angle AOC$ {The angle subtended by same chord in same segment at the centre is twice subtended the angle to at same chord in same segment the circumference.}

$$\angle ABC = \frac{1}{2} \times 36^\circ = 18^\circ$$

$$\angle BAP = 90^\circ \because AB \perp AP$$

A tangent to a circle is perpendicular to the radius through the point of contact.

In $\triangle ABP$

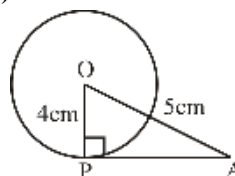
$$\begin{aligned} \angle BPQ &= \angle ABC + \angle BAP \text{ (exterior angle property)} \\ &= 18^\circ + 90^\circ \\ &= 108^\circ \end{aligned}$$

100. The length of a tangent drawn to a circle of radius 4 cm from a point 5 cm away from the center of the circle is:

- (a) $5\sqrt{3}$ cm (b) $3\sqrt{3}$ cm
(c) 5 cm (d) 3 cm

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (d) :



\therefore The radius of the circle is perpendicular to the tangent.

$$\therefore \angle OPA = 90^\circ$$

$$OA^2 = OP^2 + AP^2 \text{ (From Pythagoras theorem)}$$

$$25 = 16 + AP^2$$

$$9 = AP^2$$

$$AP = 3 \text{ cm}$$

101. If the radii of two circles are 4.5 cm and 3.5 cm and the length of the transverse common tangent is 6 cm, then the distance between the two centers will be:

- (a) 9 cm (b) 8 cm
(c) 12 cm (d) 10 cm

RRB NTPC 12.01.2021 (Shift-I) Stage Ist

Ans. (d) : The length of the transverse common tangent

$$= \sqrt{(\text{Distance between centers})^2 - (\text{Sum of radii})^2}$$

$$6 = \sqrt{(\text{Distance between centers})^2 - (4.5 + 3.5)^2}$$

on squaring both sides-

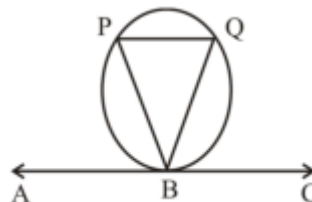
$$36 = (\text{Distance between centers})^2 - 64$$

$$\Rightarrow \text{Distance between centers} = \sqrt{36 + 64}$$

$$= \sqrt{100}$$

$$= 10 \text{ cm.}$$

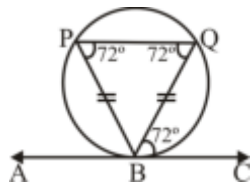
102. Line ABC is a tangent to a circle B. If BP = BQ and $\angle QBC = 72^\circ$ then $\angle PBQ$ is :



- (a) 108° (b) 72°
(c) 36° (d) 70°

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) :



$\angle QBC = 72^\circ$ (Given)

$\angle QPB = 72^\circ$ (alternate segment angle)

$\angle QPB = \angle QCB = 72^\circ$ ($\because BP = BQ$)

$\angle PBQ = 180^\circ - 2 \times 72^\circ = 180 - 144 = 36^\circ$

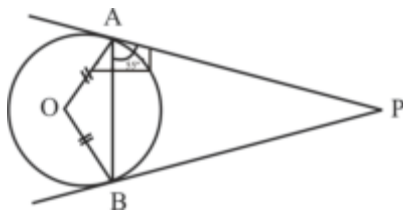
103. From an external point P, tangents PA and PB are drawn to a circle with centre O. $\angle PAB = 55^\circ$, find $\angle AOB$

(a) 100° (b) 35°

(c) 125° (d) 110°

RRB NTPC 08.01.2021 (Shift-II) Stage Ist

Ans. (d) :



Given,

$\angle PAB = 55^\circ$

$\angle OAP = 90^\circ$ ($\because OA \perp AP$)

$\angle OAB = 90^\circ - 55^\circ = 35^\circ$

$\angle OAB = \angle OBA = 35^\circ$

In $\triangle AOB$

$\angle AOB + \angle OBA + \angle OAB = 180^\circ$

$\angle AOB + 35^\circ + 35^\circ = 180^\circ$

$= 110^\circ$

104. A circle touches the side BC of triangle ABC at P. Side AB and AC are produced to touch the circle at points Q and R respectively. The length of AQ is:

(a) $\frac{1}{2}(BC + CA + AB)$

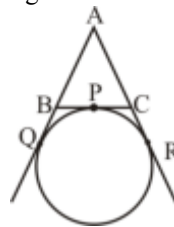
(b) $\frac{1}{4}(BC + CA + AB)$

(c) $\frac{1}{3}(BC + CA + AB)$

(d) $\frac{1}{2}(2BC + CA + AB)$

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (a) : The tangents drawn from external point to a circle are of equal length.



$\therefore BP = BQ$

And, $CP = CR$

And $AQ = AR$

$AB + BQ = AC + CR$

Now, $AB + BP = AC + CP$ (i)

Perimeter of $\triangle ABC = AB + BC + CA$

$= AB + BP + CP + CA$ [$\because BC = BP + CP$]

$= (AB + BP) + (AC + CP)$

$= 2(AB + BP)$

From equation (i)

$AB + BC + CA = 2AQ$

or $AQ = \frac{1}{2}(AB + BC + CA)$

Type - 9

Problems Based on Polygons

105. Each interior angle of a regular polygon measures 168° . How many sides does this polygon have?

(a) 36 (b) 20

(c) 30 (d) 24

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (c) : Each interior angle of regular polygon

$$= \frac{(n-2)180^\circ}{n}$$

$$\frac{(n-2)180^\circ}{n} = 168^\circ$$

$$45n - 90^\circ = 42n$$

$$3n = 90$$

$$n = 30$$

Hence number of sides of polygon = 30

106. If every interior angle of a regular polygon is 144° , then the polygon has _____ sides.

(a) 15 (b) 12

(c) 8 (d) 10

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (d) : Each interior angle = 144°

Each exterior angle = $180^\circ - 144^\circ = 36^\circ$

For each exterior angle = $\frac{360^\circ}{n}$

Where n = number of sides in polygon

Then $36^\circ = \frac{360^\circ}{n}$

$$n = 10$$

107. The ratio of the numbers of sides of two regular polygons is 1 : 2. If each interior angle of the first polygon is 140° , then the measure of each interior angle of the second polygon is:

- (a) 140° (b) 160°
(c) 170° (d) 150°

RRB NTPC 25.01.2021 (Shift-II) Stage Ist

Ans. (b) : Let the number of sides of the first polygon = x

Number of sides of the second polygon = 2x

Each interior angle of the first polygon = 140° (given)

Each exterior angle of the first polygon = $180^\circ - 140^\circ = 40^\circ$

Each exterior angle of the first polygon = $\frac{360^\circ}{x}$

Where, x = Number of sides in the polygon.

$$40^\circ = \frac{360^\circ}{x}$$

$$x = 9$$

Number of sides of the second polygon = 2x = $2 \times 9 = 18$

Each exterior angle = $\frac{360^\circ}{18} = 20^\circ$

Each interior angle of the second polygon = $180^\circ - 20^\circ = 160^\circ$

108. Two regular polygons have the same number of sides. If the lengths of the sides are in the ratio 3:5, then the ratio of their respective areas is:

- (a) 9 : 25 (b) 4 : 7
(c) 3 : 23 (d) 6 : 11

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (a) : The ratio of respective areas = $(3)^2 : (5)^2 = 9 : 25$

109. 4 angles of a pentagon are 70° , 110° , 135° and 95° . Find the measure of the fifth angle of the pentagon.

- (a) 134° (b) 132°
(c) 128° (d) 130°

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let fifth angle = x°

Sum of interior angles of a polygon = $(n - 2) \times 180^\circ$

\therefore Number of sides (n) = 5

\therefore Sum of angle of pentagon = $(5 - 2) \times 180^\circ = 540^\circ$

According to the question-

$$70^\circ + 110^\circ + 135^\circ + 95^\circ + x^\circ = 540^\circ$$

$$x^\circ = 540^\circ - 410^\circ$$

Hence, the fifth angle = $x^\circ = 130^\circ$

110. If the difference between the interior and exterior angles of a polygon is 36° , then find the number of sides in the polygon.

- (a) 8 (b) 7
(c) 6 (d) 5

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let each interior angle = x°

So, exterior angle = $180^\circ - x^\circ$

According to the question,

$$x^\circ - (180^\circ - x^\circ) = 36^\circ$$

$$2x = 216^\circ$$

$$x = 108^\circ$$

Exterior angle = $180^\circ - 108^\circ = 72^\circ$

No of sides in the polygon = $\frac{360^\circ}{72^\circ} = 5$

111. The ratio of an interior angle to the exterior angle of a regular polygon is 4 : 1. The number of sides of the polygon is:

- (a) 12 (b) 10
(c) 5 (d) 6

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (b) : Let the interior and exterior angles of polygon be 4x and 'x'.

Interior + Exterior angle = 180°

$$4x + x = 180^\circ$$

$$5x = 180^\circ$$

$$x = 36^\circ$$

Hence Exterior angle = 36°

If polygon has 'n' sides then exterior angle = $\frac{360}{n}$

$$36 = \frac{360}{n}$$

$$n = \frac{360}{36} = 10$$

Hence the number of sides in polygon (n) = 10

112. The difference of interior angles and exterior angles on the vertices of a quadrilateral is 160° . Find the sides of a polygon?

- (a) 36 (b) 42
(c) 40 (d) 38

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (a) :

Interior angle + Exterior = 180° (by theorem)

Interior angle - Exterior = 160°

$$2 \times \text{Exterior angle} = 20^\circ$$

$$\text{Exterior} = 10^\circ$$

Number of sides of a polygon = $\frac{360^\circ}{10^\circ} = 36$

113. Each interior angle of a regular polygon is 140° . Find the number of sides of the polygon.

- (a) 15 (b) 18
(c) 9 (d) 12

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (c) : Let number of sides of the polygon is n .
 \therefore Each interior angle of polygon $= 140^\circ$

$$\Rightarrow \left(\frac{n-2}{n} \right) \times 180^\circ = 140^\circ$$

$$\Rightarrow \left(\frac{n-2}{n} \right) = \frac{140}{180}$$

$$\Rightarrow 9n - 18 = 7n$$

$$\Rightarrow 2n = 18$$

$$\Rightarrow n = 9$$

Hence the number of sides of polygon $n = 9$

114. Find the ratio of the measure of an angles of a regular pentagon to that of a regular octagon.

- (a) 5 : 6 (b) 6 : 7
 (c) 4 : 5 (d) 7 : 8

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (c) : Measure of Interior angle of regular pentagon

$$= \frac{(5-2)}{5} \times 180^\circ = \frac{3}{5} \times 180^\circ$$

Measure of interior angle of regular octagon

$$= \frac{(8-2)}{8} \times 180^\circ = \frac{6}{8} \times 180^\circ$$

$$\text{Required Ratio} = \frac{3}{5} : \frac{6}{8} = 24 : 30 = 4 : 5$$

115. In a polygon, the sum of the interior angles is triple the sum of the exterior angles. The number of sides is:

- (a) 6 (b) 9
 (c) 7 (d) 8

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : Sum of interior angles of n sides polygon $= (n-2) \times 180^\circ$

Sum of exterior angles of polygon $= 360^\circ$

According to the question,

$$(n-2) \times 180^\circ = 3 \times 360^\circ$$

$$n-2 = 6 \Rightarrow n = 8$$

116. If the difference between the exterior and the interior angles of a regular polygon is 60° , with an interior angle being greater than the corresponding exterior angle, then find the number of sides of the polygon.

- (a) 6 (b) 5
 (c) 7 (d) 8

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : We know that,

$$\text{Interior angle} + \text{Exterior angle} = 180^\circ \quad \dots(i)$$

$$\text{Given, Interior angle} - \text{Exterior angle} = 60^\circ \quad \dots(ii)$$

From equation (i) and equation (ii)

$$2 \text{ Interior angle} = 240^\circ$$

$$\text{Interior angle} = 120^\circ$$

$$\text{Exterior angle} = 60^\circ \quad [\text{From equation (i)}]$$

$$\begin{aligned} \text{Number of sides of polygon} &= \frac{360^\circ}{\text{Exterior angle}} \\ &= \frac{360^\circ}{60^\circ} = 6 \end{aligned}$$

117. Every interior angle of a regular octagon is 135° . Find the exterior angle of the octagon.

- (a) 45° (b) 75°
 (c) 65° (d) 55°

RRB NTPC 17.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$\text{Interior angle} + \text{exterior angle} = 180^\circ$$

$$135^\circ + \text{exterior angle} = 180^\circ$$

$$\begin{aligned} \text{exterior angle} &= 180^\circ - 135^\circ \\ &= 45^\circ \end{aligned}$$

118. The sum of the interior angles of a polygon measure 3240° . How many sides does the polygon have?

- (a) 10 (b) 20
 (c) 5 (d) 15

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (b) :

The sum of interior angles of a polygon

$$= (n-2) \times 180^\circ$$

$$3240^\circ = (n-2) \times 180^\circ$$

$$n-2 = 18$$

$$n = 20$$

Hence number of sides in the polygon is 20.

119. The interior angle of a regular polygon is 108° . The number of the sides of the polygon is:

- (a) 108 (b) 5
 (c) 360 (d) 15

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (b) : Internal angle of an equilateral polygon $= 108^\circ$

Each external angle $= 180^\circ - \text{internal angle}$

$$= 180^\circ - 108^\circ$$

$$= 72^\circ$$

Number of sides in an equilateral polygon (n)

$$= \frac{360^\circ}{\text{Each external angle}}$$

$$= \frac{360^\circ}{72^\circ}$$

$$= \boxed{n = 5}$$

120. The exterior angle of a rectangular polygon is 72° . Find the internal angle.

- (a) 180° (b) 120°
 (c) 108° (d) 160°

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (c) : In any polygon,
 Interior angle + Exterior angle = 180°
 Interior angle + $72^\circ = 180^\circ$
 \Rightarrow Interior angle = 108°

121. If each interior angle of a regular polygon is 120° , then find the number of diagonals of the polygon.

- (a) 9 (b) 4
 (c) 8 (d) 6

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : If a polygon has 'n' number of sides, then all interior angles of the polygon = $\frac{(n-2) \times 180}{n}$

According to the question, $\frac{(n-2) \times 180}{n} = 120$

$$180n - 360 = 120n$$

$$180n - 120n = 360$$

$$60n = 360$$

$$n = \frac{360}{60} = 6$$

Hence, number of sides $n = 6$

Then number of diagonal = $\frac{n(n-3)}{2}$

$$\begin{aligned} \text{Number of diagonals in polygon} &= \frac{6(6-3)}{2} \\ &= \frac{6 \times 3}{2} = \frac{18}{2} \\ &= 9 \text{ diagonals} \end{aligned}$$

122. If the interior angles of a pentagon are in the ratio 1 : 3 : 5 : 7 : 11, then the measure of smallest interior angle is

- (a) 15° (b) 10°
 (c) 25° (d) 20°

RRB NTPC 16.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let interior angle of given pentagon are x , $3x$, $5x$, $7x$ and $11x$.

\therefore Sum of all interior angle of pentagon is = 540°

$$27x = 540^\circ$$

$$x = \frac{540}{27} = 20^\circ$$

Hence, smallest angle is $x = 20^\circ$

123. What is the measure of each exterior angle of a regular octagon?

- (a) 30° (b) 45°
 (c) 50° (d) 60°

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\text{Each exterior angle of octagon} = \frac{360^\circ}{8} = 45^\circ$$

124. The difference between the interior and exterior angles at the vertex of a regular polygon is 140° . The number of sides of the polygon is:

- (a) 18 (b) 20
 (c) 24 (d) 22

RRB NTPC 08.02.2021 (Shift-I) Stage Ist

Ans. (a) : No. of sides of polygon

$$= \frac{(2n-4) \times 90^\circ}{n} - \frac{360^\circ}{n} = 140$$

$$180n - 360 - 360 = 140n$$

$$180n - 140n = 720$$

$$40n = 720$$

$$n = 18$$

125. The exterior angles of any polygon sum upto:

- (a) 270° (b) 180°
 (c) 360° (d) 90°

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (c) : The sum of the exterior angles of any polygon is 360° .

126. In a polygon, each exterior angle is 120° , then the number of sides is-

- (a) 6 (b) 4
 (c) 3 (d) 5

RRB NTPC 07.04.2016 Shift : 3

Ans : (c)

$$\begin{aligned} \text{Number of sides of polygon} &= \frac{360^\circ}{\text{each exterior angle}} \\ &= \frac{360}{120} = 3 \end{aligned}$$

127. In a regular polygon, each exterior angle is 60° then the number of sides:

- (a) 7 (b) 5
 (c) 6 (d) 8

RRB NTPC 26.04.2016 Shift : 2

$$\text{Ans : (c) Each exterior angle of polygon} = \frac{360^\circ}{n}$$

$$\therefore n = \frac{360^\circ}{60^\circ} = 6$$

128. The number of sides of a regular polygon whose internal angle is 150° will be-

- (a) 15 (b) 13
 (c) 12 (d) 14

RRB NTPC 17.01.2017 Shift-3

Ans : (c) Let number of sides = n

$$\text{Each interior angle of regular polygon} = \frac{(2n-4)90^\circ}{n}$$

$$150 = \frac{180n - 360}{n}$$

$$150n = 180n - 360$$

$$30n = 360^\circ \Rightarrow n = 12$$

129. In a regular polygon, each exterior angle is 36° . Find the number of its sides.
- (a) 11 (b) 9
(c) 10 (d) 8

RRB NTPC 07.04.2016 Shift : 2

Ans : (c) In polygon

$$\text{Each exterior angle} = \frac{360^\circ}{\text{number of sides}}$$

$$\Rightarrow 36^\circ = \frac{360^\circ}{\text{number of sides}}$$

\therefore Number of sides = 10

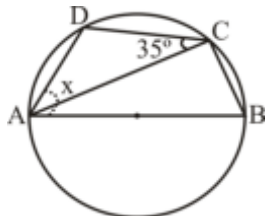
Type - 10 Miscellaneous

130. ABCD is a cyclic quadrilateral. AB is a diameter of the circle. If $\angle ACD = 35^\circ$ find the value of $\angle BAD$.

- (a) 70° (b) 55°
(c) 45° (d) 60°

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (b) :



$\angle ACB = 90^\circ$ (Diameter makes a right angle to the circumference)

$$\begin{aligned}\angle BCD &= \angle ACB + \angle ACD \\ &= 90^\circ + 35^\circ \\ &= 125^\circ\end{aligned}$$

$\angle BAD + \angle BCD = 180^\circ$ (From cyclic quadrilateral)

$$\angle BAD = 180^\circ - \angle BCD$$

$$\angle BAD = 180^\circ - 125^\circ$$

$$\therefore \angle BAD = 55^\circ$$

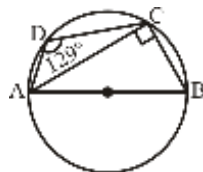
131. ABCD is a cyclic quadrilateral whose side AB is a diameter of the circle through A, B, C and D. If $\angle ADC = 129^\circ$, then what is the measure of $\angle BAC$?

- (a) 51° (b) 49°
(c) 39° (d) 41°

RRB NTPC (Stage-II) -16/06/2022 (Shift-II)

Ans. (c) : Given,

In cyclic quadrilateral ABCD—



$$\angle ADC = 129^\circ$$

$$AB = \text{diameter}$$

$$\angle BAC = ?$$

$\angle ACB = 90^\circ$ {In semicircle Diameter makes a right angle to the circumference}

$$\angle ABC + \angle ADC = 180^\circ$$

$$\angle ABC = 180^\circ - 129^\circ$$

$$\angle ABC = 51^\circ$$

Then, In $\triangle ABC$,

$$\angle BAC + \angle ACB + \angle ABC = 180^\circ$$

$$\angle BAC + 90^\circ + 51^\circ = 180^\circ$$

$$\angle BAC = 180^\circ - 141^\circ$$

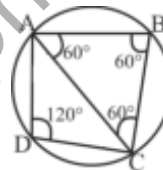
$$\angle BAC = 39^\circ$$

132. If ABCD is a cyclic quadrilateral and ABC is an equilateral triangle find the angle of $\angle CDA$

- (a) 45° (b) 90°
(c) 120° (d) 60°

RRB NTPC 01.02.2021 (Shift-II) Stage Ist

Ans. (c) :



\therefore In any cyclic quadrilateral the sum of opposite angle of quadrilateral is 180°

Hence,

$$\angle CDA + \angle ABC = 180^\circ$$

$$\angle CDA + 60^\circ = 180^\circ$$

$$\angle CDA = 180^\circ - 60^\circ = 120^\circ$$

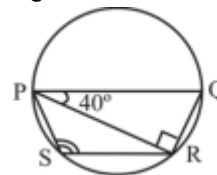
133. PQRS is a cyclic trapezium where PQ is parallel to RS and PQ is the diameter. If $\angle QPR = 40^\circ$ then $\angle PSR$ is equal to:

- (a) 120° (b) 140°
(c) 130° (d) 110°

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (c) : \therefore Angle made in semicircle is right angle.

$\therefore \angle PRQ = 90^\circ$ [Angle made in semicircle]



In $\triangle PQR$,

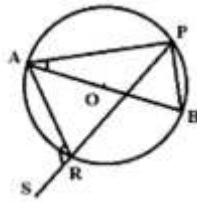
$$\begin{aligned}\angle PQR &= 180^\circ - (40^\circ + 90^\circ) \\ &= 50^\circ\end{aligned}$$

\therefore The sum of opposite angles in a cyclic quadrilateral is 180°

$$\therefore \angle PSR + \angle PQR = 180^\circ$$

$$\angle PSR = 180^\circ - 50^\circ = 130^\circ$$

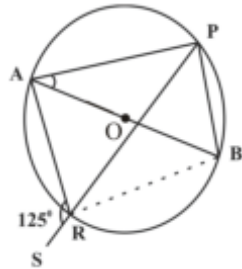
134. In the figure, O is the centre of the circle. If $\angle ARS = 125^\circ$, then find the measure of $\angle PAB$.



- (a) 125° (b) 55°
(c) 145° (d) 35°

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question –



$$\angle ARP = 180^\circ - 125^\circ = 55^\circ$$

Angle formed in semicircle will be right angle.

$$\angle APB = 90^\circ$$

$$\angle APB + \angle ARB = 180^\circ \quad (\text{Cyclic quadrilateral})$$

$$90^\circ + \angle ARP + \angle PRB = 180^\circ$$

$$90^\circ + 55^\circ + \angle PRB = 180^\circ$$

$$\angle PRB = 35^\circ$$

$$\angle PAB = \angle PRB = 35^\circ$$

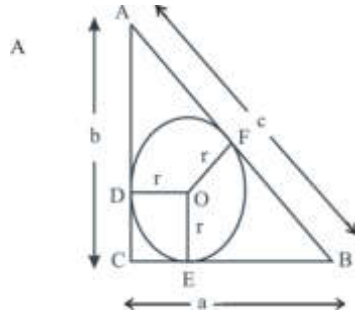
Angle formed at circumference of circle by a chord in same segment is always same.

135. a, b and c are the sides of a right triangle with c as hypotenuse. The radius r, of the circle which touches the three sides of the triangle is:

- (a) $r = \frac{(a+b+c)}{2}$ (b) $r = \frac{(a-b-c)}{2}$
(c) $r = \frac{(a-b+c)}{2}$ (d) $r = \frac{(a+b-c)}{2}$

RRB NTPC 10.01.2021 (Shift-II) Stage Ist

Ans. (d) :



$$\begin{aligned} AB &= c \\ BC &= a \\ AC &= b \end{aligned}$$

The tangent of the circle and the external points will be equal

$$AD = AF$$

$$CD = CE$$

$$BE = BF$$

$$EODC \text{ is a square, } OE = CD = r$$

$$c = AF + FB$$

$$c = AD + BE$$

$$c = (CA - DC) + (BC - CE)$$

$$c = b - r + a - r$$

$$c = a + b - 2r$$

$$2r = a + b - c$$

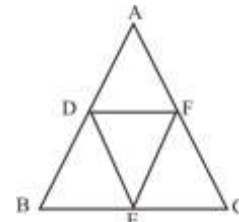
$$r = \left(\frac{a + b - c}{2} \right)$$

136. In an equilateral triangle ABC, D, E, F are the midpoints of AB, BC and AC respectively. So the quadrilateral BEFD is:

- (a) A square (b) A rectangle
(c) A parallelogram (d) A rhombus

RRB NTPC 29.03.2016 Shift : 1

Ans. (c)



In a triangle, the line joining the midpoints of two sides is Parallel and half of the third side.

$$DF \parallel BC$$

$$\text{and } DF = \frac{1}{2} BC \quad \dots\dots(i)$$

\therefore E is the mid point of BC

$$\therefore BE = \frac{1}{2} BC \quad \dots\dots(ii)$$

From the equation (i) and equation (ii)

$$DF = BE$$

$$\therefore DF \parallel BC \Rightarrow DF \parallel BE$$

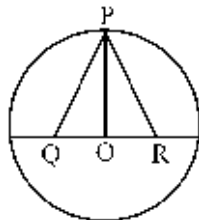
So quadrilateral BEFD is a parallelogram

137. An equilateral triangle is constructed in such a way that the two end of the triangle are placed on the diameter of the circle and the third is placed on the circle. If the area of the circle is 48π then what will be the side of the triangle.

- (a) 8 (b) 4
(c) $8/\sqrt{3}$ (d) $4\sqrt{3}$

RRB NTPC 10.04.2016 Shift : 3

Ans : (a) From the figure,



Let the radius of the circle = r
 \therefore Area of circle = πr^2
 $= 48\pi = \pi r^2$
 $r = \sqrt{48} = 4\sqrt{3}$
 Radius = length of OP which is perpendicular of equilateral triangle PQR.

$$\Rightarrow 4\sqrt{3} = \frac{\sqrt{3}}{2}a$$

$$\therefore a = 4 \times 2 = 8$$

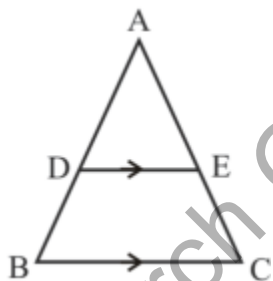
Hence, the length of side of triangle $a = 8$

138. In $\triangle ABC$, $DE \parallel BC$ which intersects AB to D and AC to E . $AD : BD = 2 : 3$ and the area of trapezium $BDEC$ is 63 cm^2 . What is the area of $\triangle ADE$?

- (a) 14 cm^2 (b) 28 cm^2
 (c) 42 cm^2 (d) 12 cm^2

RRB NTPC (Stage-II) 17/06/2022 (Shift-II)

Ans. (d) :



Given,

$$AD : BD = 2 : 3$$

$$\text{Area of trapezium } BDEC = 63 \text{ cm}^2$$

$$\text{Let area of } \triangle ADE = P \text{ cm}^2$$

According to the question,

$$\frac{AD^2}{AB^2 - AD^2} = \frac{P}{63}$$

$$\frac{2^2}{(2+3)^2 - (2)^2} = \frac{P}{63}$$

$$\frac{4}{25-4} = \frac{P}{63}$$

$$\frac{4}{21} = \frac{P}{63}$$

$$P = 4 \times 3$$

$$\therefore P = 12 \text{ cm}^2$$

139. The area of a triangle ABC is 63 square unit. Two parallel lines DE , FG are drawn such that it divides AB and AC into three equal parts. What is the area of quadrilateral $DEFG$?

- (a) 28 Square unit (b) 35 Square unit
 (c) 21 Square unit (d) 48 Square unit

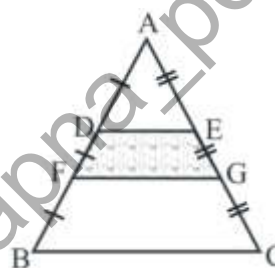
RRB NTPC 02.04.2016 Shift : 2

Ans : (c) In similar $\triangle ADE$ and $\triangle ABC$ —

$$\frac{\text{Area of } \triangle ADE}{\text{Area of } \triangle ABC} = \left(\frac{AD}{AB}\right)^2$$

$$\frac{\text{Area of } \triangle ADE}{63} = \left(\frac{AD}{3AD}\right)^2$$

$$\text{Area of } \triangle ADE = 7 \text{ square unit}$$



$$\Rightarrow \triangle AFG \sim \triangle ABC$$

$$\frac{\text{Area of } \triangle AFG}{\text{Area of } \triangle ABC} = \left(\frac{AF}{AB}\right)^2$$

$$\Rightarrow \frac{\text{Area of } \triangle AFG}{63} = \left(\frac{2AD}{3AD}\right)^2$$

$$\Rightarrow \text{Area of } \triangle AFG = \frac{4}{9} \times 63 = 28 \text{ Square unit}$$

$$\therefore \text{Area of } \square DEFG = \triangle AFG - \triangle ADE$$

$$= 28 - 7 = 21 \text{ Square unit}$$

140. The order of a rotational symmetry of a square is:

- (a) 2 (b) 6
 (c) 4 (d) 8

RRB NTPC 07.04.2016 Shift : 3

Ans : (c) The four sides of the square are equal and each angle is 90° . Hence, its rotational symmetry will be 4 in order.

141. The order of the rotational symmetry of a rectangle is:

- (a) 1 (b) 4
 (c) 2 (d) 0

RRB NTPC 11.04.2016 Shift : 1

Ans : (c) The order of the rotational symmetry of the rectangle is 2.

26.

Elementary Statistics/Probability

Type - 1 Problems Based on Mean of Data

1. If each of the observations of 14, 22, 16, 24, 12, 8, 4, 18, 12. 10 is increased by 10 then what will be their new mean ?

(a) 16 (b) 26 (c) 14 (d) 24

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (d) : Mean = $\frac{\text{Sum of observation}}{\text{Number of observation}}$

$$= \frac{14 + 22 + 16 + 24 + 12 + 8 + 4 + 18 + 12 + 10}{10}$$

$$= \frac{140}{10} = 14$$

New Mean = $14 + 10 = 24$

2. The scores obtained by 10 students in a test are 82, 60, 62, 63, 78, 75, 86, 75, 91, 46. Find the arithmetic mean of their scores.

(a) 70.6 (b) 71.8
(c) 72.2 (d) 72.8

RRB NTPC (Stage-II) -16/06/2022 (Shift-I)

Ans. (b) : Arithmetic mean = $\frac{\text{Total sum of Scores}}{\text{Number of Students}}$

$$= \frac{82 + 60 + 62 + 63 + 78 + 75 + 86 + 75 + 91 + 46}{10}$$

$$= \frac{718}{10} = 71.8$$

3. If the mean of numbers 33, x, 47, 83 and 109 is 67, what is the mean of 50, 64, 100, 126 and x?

(a) 84 (b) 81.8
(c) 80.6 (d) 80

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : According to the question,

$$67 = \frac{33 + x + 47 + 83 + 109}{5}$$

$$335 = x + 272$$

$$x = 63$$

Now,

$$\frac{50 + 64 + 100 + 126 + 63}{5}$$

$$= 80.6$$

4. The mean of the values 1, 2, 3, 4,, n with respective frequencies 1, 2, 3,, n is:

(a) $\frac{2n-1}{3}$ (b) $\frac{2n+1}{3}$ (c) $\frac{n+1}{2}$ (d) $\frac{n-1}{2}$

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (b) : $\sum f_i x_i = (1 \times 1) + (2 \times 2) + (3 \times 3) + \dots - n \times n$

Where, f_i = Frequency, x_i = Observation

$$= 1^2 + 2^2 + 3^2 + \dots - n^2$$

$$= \frac{n(n+1)(2n+1)}{6}$$

and $\sum f_i = 1 + 2 + 3 + \dots - n$

$$= \frac{n(n+1)}{2}$$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{\frac{n(n+1)(2n+1)}{6}}{\frac{n(n+1)}{2}} = \frac{2n+1}{3}$$

5. If the mean of the following data is 15, then find the value of k.

x	5	10	15	20	25
f	6	k	6	10	5

(a) 6 (b) 10
(c) 8 (d) 7

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question—

(x)	(f)	(f × x)
5	6	30
10	k	10k
15	6	90
20	10	200
25	5	125

$$\sum f = 27 + k \quad \sum f.x = 445 + 10k$$

$$\text{Mean} = \frac{445 + 10k}{27 + k} = 15$$

$$405 + 15k = 445 + 10k$$

$$k = 8$$

6. The following table gives a frequency distribution whose arithmetic mean is 33. Find the product of the possible values of k from the distribution.

Value (X)	Frequency (f)
29	4
30	3
30 + k	3k
34	2
62	1

(a) 5 (b) 2
(c) 3 (d) 4

RRB NTPC 24.07.2021 (Shift-II) Stage Ist

Ans. (b) : According to the question–

Value (x)	Frequency (f)	(f×x)
29	4	116
30	3	90
30+k	3k	90k+3k ²
34	2	68
62	1	62
	$\Sigma f = 10+3k$	$\Sigma fx = 336+90k+3k^2$

We know that,

$$\text{Arithmetic mean} = \frac{\Sigma fx}{\Sigma f}$$

$$33 = \frac{336+90k+3k^2}{10+3k}$$

$$330 + 99k = 336 + 90k + 3k^2$$

$$3k^2 + 90k - 99k + 336 - 330 = 0$$

$$3k^2 - 9k + 6 = 0$$

$$k^2 - 3k + 2 = 0$$

$$(k - 2)(k - 1) = 0$$

$$k = 2, 1$$

Hence, the number of possible value of k = 2

7. If mean of the following distribution is 26, then what is the value of k ?

Class	0-10	10-20	20-30	30-40	40-50
Frequency	8	10	k	6	12

(a) 10

(b) 1

(c) 4

(d) 8

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

Class	Midpoint (x)	Frequency (f)	F(x)
0-10	5	8	40
10-20	15	10	150
20-30	25	k	25k
30-40	35	6	210
40-50	45	12	540

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{40+150+25k+210+540}{8+10+k+6+12}$$

$$26 = \frac{940+25k}{36+k}$$

$$936 + 26k = 940 + 25k$$

$$k = 4$$

8. Find the mean height of persons from the following data.

Height (cm)	No. of persons
120	3
130	4
140	5
150	6
160	2

(a) 145 cm

(b) 140 cm

(c) 160 cm

(d) 150 cm

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question,

Height (cm) (x _i)	No. of persons (f _i)	f _i x _i
120	3	360
130	4	520
140	5	700
150	6	900
160	2	320
	$\Sigma f_i = 20$	$\Sigma f_i x_i = 2800$

$$\text{Mean height of persons} = \frac{\Sigma (f_i x_i)}{\Sigma f_i} = \frac{2800}{20}$$

$$= 140 \text{ cm}$$

9. The mean of 25 observations is 36. If the mean of its first 13 observations is 32 and the last 13 observations is 40, then what will be its 13th observation ?

(a) 38 (b) 23 (c) 36 (d) 40

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the question,

Let its 13th observation is x.

$$\therefore x = 13(40 + 32) - 25 \times 36$$

$$x = 13 \times 72 - 25 \times 36$$

$$x = 936 - 900 \Rightarrow x = 36$$

10. Find the mean of x + 77, x + 7, x + 5, x + 3 and x - 2.

(a) x + 18

(b) x + 8

(c) x - 3

(d) x - 8

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (a) : We know that,

$$\text{Mean} = \frac{\text{Sum of terms}}{\text{No. of terms}}$$

$$= \frac{(x-2) + (x+3) + (x+5) + (x+7) + (x+77)}{5}$$

$$= \frac{5x+90}{5}$$

$$= \frac{5(x+18)}{5} = (x+18)$$

11. Calculate the mean of following set of values– 2.2, 4.2, 6.4, 8.3, 10.5

(a) 6.50

(b) 7

(c) 6.32

(d) 6.12

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (c) :

$$\text{Mean value of the set} = \frac{2.2+4.2+6.4+8.3+10.5}{5}$$

$$= \frac{31.6}{5} = 6.32$$

12. If the mean of the following data is 11, find the value of 'k'

11, 19, 5, 10, k, 13, 12, 8, 15, 14

(a) 13

(b) 12

(c) 3

(d) 11

RRB NTPC 10.01.2021 (Shift-I) Stage Ist

Ans. (c) : Mean of the data = $\frac{\text{Sum of all terms}}{\text{Number of all terms}}$

$$11 = \frac{11+19+5+10+k+13+12+8+15+14}{10}$$

$$107 + k = 110$$

$$\therefore k = 3$$

- 13. The arithmetic mean of X observations is m. If two observations 0 and m are added, then the new mean will be:**

- (a) $\frac{mx}{x+1}$ (b) m
(c) $\frac{m}{x+1}$ (d) $\frac{m(x+1)}{x+2}$

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (d) : Sum of x observations = mx
If 0 and m are added to them, then the new mean –

$$\text{Mean} = \frac{mx + 0 + m}{x + 2}$$

$$= \frac{m(x+1)}{x+2}$$

- 14. Find the mean of the following data:**

X:	19	21	23	25	27	29	31
F:	13	15	16	18	16	15	13

- (a) 30 (b) 28
(c) 20 (d) 25

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question–

(x)	(f)	(fx)
19	13	247
21	15	315
23	16	368
25	18	450
27	16	432
29	15	435
31	13	403
Total = $\sum f = 106$		$\sum fx = 2650$
$\text{Mean}(\bar{x}) = \frac{\sum fx}{\sum f} = \frac{2650}{106}$		
$\bar{x} = 25$		

- 15. Find the missing frequency(p) for the following distribution whose mean is 8:**

x:	3	5	7	9	11	13
f:	6	8	15	p	8	4

- (a) 18 (b) 12
(c) 10 (d) 25

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (d): From given data–

(x)	(f)	(fx)
3	6	18
5	8	40
7	15	105
9	p	9p
11	8	88
13	4	52
Sum = $\sum f = 41 + p$		$\sum (fx) = 303 + 9p$

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$8 = \frac{303 + 9p}{41 + p}$$

$$8(41 + p) = 303 + 9p$$

$$328 + 8p = 303 + 9p$$

$$9p - 8p = 328 - 303$$

$$p = 25$$

- 16. Find the mean of the following distribution.**

x :	5	6	7	8	9
f :	4	8	14	11	3

- (a) 8.325 (b) 7.025
(c) 5.225 (d) 9.125

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$\sum fx = 5 \times 4 + 6 \times 8 + 7 \times 14 + 8 \times 11 + 9 \times 3$$

$$= 20 + 48 + 98 + 88 + 27$$

$$= 281$$

$$\sum f = 4 + 8 + 14 + 11 + 3$$

$$= 40$$

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{281}{40}$$

$$= 7.025$$

- 17. Find the missing value of p for the following distribution, whose mean is 12.58.**

x:	5	8	10	12	p	20	25
f:	2	5	8	22	7	4	2

- (a) 20 (b) 15
(c) 10 (d) 13

RRB NTPC 11.01.2021 (Shift-I) Stage Ist

Ans. (b) : From question–

$$\sum fx = 5 \times 2 + 8 \times 5 + 10 \times 8 + 12 \times 22 + 7 \times p + 20 \times 4 + 25 \times 2$$

$$= 10 + 40 + 80 + 264 + 7p + 80 + 50$$

$$= 524 + 7p$$

$$\sum f = 2 + 5 + 8 + 22 + 7 + 4 + 2$$

$$= 50$$

$$\therefore \text{Mean} = \frac{\sum f \cdot x}{\sum f}$$

$$12.58 = \frac{524 + 7p}{50}$$

$$7p = 629 - 524$$

$$7p = 105$$

$$p = 15$$

- 18. The mean of the squares of the first ten natural numbers is:**

- (a) 385 (b) 231
(c) $\frac{11}{2}$ (d) $\frac{77}{2}$

RRB NTPC 15.03.2021 (Shift-II) Stage Ist

Ans. (d) : The sum of the squares of the first 'n' natural numbers = $\frac{n(n+1)(2n+1)}{6}$

Here, $n = 10$

$$\text{Sum} = \frac{10(10+1)(2 \times 10+1)}{6} = \frac{10 \times 11 \times 21}{6}$$

$$\text{Mean} = \frac{10 \times 11 \times 21}{10 \times 6} = \frac{11 \times 7}{2} = \frac{77}{2}$$

19. The mean of the first ten odd natural numbers is:

- (a) 11 (b) 10
(c) 8 (d) 9

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (b) : First ten odd natural numbers-

$\Rightarrow 1, 3, 5, 7, 9, 11, 13, 15, 17, 19$

$$\text{Mean} = \frac{1+3+5+7+9+11+13+15+17+19}{10}$$

$$= \frac{100}{10} = 10$$

20. The difference between the mean of the first 5 composite numbers and the mean of the first five prime numbers is:

- (a) 2.4 (b) 2.6
(c) 1.6 (d) 1.8

RRB NTPC 07.01.2021 (Shift-I) Stage Ist

Ans. (d) :

Mean of the first five composite numbers

$$= \frac{4+6+8+9+10}{5}$$

$$= \frac{37}{5} = 7.4$$

Mean of the first five prime numbers

$$= \frac{2+3+5+7+11}{5} = \frac{28}{5}$$

$$= 5.6$$

$$\text{Required difference} = 7.4 - 5.6 = 1.8$$

21. The mean of the first eight odd natural numbers is :

- (a) 10 (b) 9
(c) 11 (d) 8

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (d) : First eight odd natural numbers are-
1, 3, 5, 7, 9, 11, 13, 15

$$\text{Arithmetic Mean} = \frac{\text{Sum of all observations}}{\text{Total number of observations}}$$

$$\text{Mean} = \frac{1+3+5+7+9+11+13+15}{8} = \frac{64}{8}$$

$$\text{Mean} = 8$$

22. The difference between the mean of the first eight composite natural numbers and the mean of the first eight prime numbers is:

$$(a) \frac{3}{20}$$

$$(b) \frac{1}{5}$$

$$(c) \frac{1}{4}$$

$$(d) \frac{1}{8}$$

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (d) : First eight composite natural numbers = 4, 6, 8, 9, 10, 12, 14, 15

$$\text{Mean} = \frac{4+6+8+9+10+12+14+15}{8} = \frac{78}{8}$$

First eight prime numbers = 2, 3, 5, 7, 11, 13, 17, 19

$$\text{Mean} = \frac{2+3+5+7+11+13+17+19}{8} = \frac{77}{8}$$

$$\text{Required difference} = \frac{78}{8} - \frac{77}{8} = \frac{1}{8}$$

23. If the mean of five observations $x, x-1, x-2, x-3$ and $x-4$ is 20, then the mean of the first two observations is :

- (a) 20.5 (b) 23.5
(c) 22.5 (d) 21.5

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (d) : Arithmetic mean = $\frac{\text{Sum of all observations}}{\text{Total no. of observations}}$

According to the question,

$$\frac{x+x-1+x-2+x-3+x-4}{5} = 20$$

$$5x-10=100$$

$$\Rightarrow 5x=110$$

$$x = 22$$

$$\begin{aligned} \therefore \text{Mean of the first two observations} &= \frac{2x-1}{2} \\ &= x - 0.5 \\ &= 22 - 0.5 = 21.5 \end{aligned}$$

24. If the arithmetic mean of 10 numbers is 35 and each number is increased by 2, find the mean of the new set of numbers.

- (a) 28 (b) 34
(c) 40 (d) 37

RRB NTPC 05.04.2016 Shift : 3

Ans : (d) Arithmetic mean of 10 numbers = 35

$$\text{Sum of 10 numbers} = 35 \times 10 = 350$$

If each number increased by 2,

$$\text{NOTE : New sum of 10 numbers} = 350 + 10 \times 2 = 370$$

$$\therefore \text{New arithmetic mean of 10 numbers} = \frac{370}{10} = 37$$

When each number is increased by n , then the arithmetic mean also increased by n .

\therefore Each number increased by 2, New arithmetic mean will be = $35 + 2 = 37$

25. The mean of the marks obtained by 12 students of a class is 67.4. If the mean of marks obtained by 15 students of another class is 72.3, then what will be the combined mean of both the classes?

- (a) 70.12 (b) 69.85
(c) 71.23 (d) 68.94

RRB NTPC 03.04.2016 Shift : 2

Ans : (a) Sum of marks obtained by 12 students
 $= 12 \times 67.4$
 $= 808.8$
Sum of marks obtained by 15 students $= 15 \times 72.3$
 $= 1084.5$
Combined mean of both the classes $= \frac{808.8 + 1084.5}{12 + 15}$
 $= \frac{1893.3}{27}$
 $= 70.12$

26. 4 out of 5 cricketers have played the innings of 13, 9, 5, 11 respectively. If the mean of the data set is 9. Then what will be the number of innings played by that 5th player?
(a) 9 (b) 8
(c) 7 (d) 6

RRB NTPC 05.04.2016 Shift-1

Ans : (c) Total number of innings played by all five players $= 5 \times 9 = 45$
Total number of innings of four Players
 $= 13 + 9 + 5 + 11 = 38$
 \therefore Fifth player's total number of innings $= 45 - 38 = 7$

27. The mean of 8 observations is 10.5. In the given observation of the seven observations are 3, 15, 7, 19, 12, 17 and 8. Find the 8th observation-
(a) 10 (b) 11
(c) 3 (d) 12

RRB NTPC 04.04.2016 Shift : 1

Ans : (c) Sum of seven observation $= 3 + 15 + 7 + 19 + 12 + 17 + 8 = 81$
 \therefore 8th observation $= 8 \times 10.5 - 81$
 $= 84.0 - 81 = 3$

28. The mean of 20 observations is 19. One another observation is included and the new mean is 20. What is 21st observation?
(a) 20 (b) 30
(c) 40 (d) 42

RRB NTPC 19.04.2016 Shift : 2

Ans : (c) Total sum of 20 observations $= 20 \times 19 = 380$
Sum on inclusion of new observation $= 21 \times 20 = 420$
 \therefore Value of 21st observation $= 420 - 380 = 40$

29. The mean of the four different observations is 17.5. When a new observation whose value is 20 is added to it, then what will be its new mean?
(a) 18 (b) 17.5
(c) 19 (d) 18.5

RRB NTPC 28.03.2016 Shift : 2

Ans : (a) According to the question,
Sum of four observation $= 17.5 \times 4 = 70.0$
Adding new observation $= 70 + 20 = 90$
New mean $= \frac{90}{5} = 18$

30. The arithmetic mean of 20 observation is 15.5, later it was found that an observation written 42 by mistake instead of 24. Find out the correct mean?

- (a) 14 (b) 14.4
(c) 14.6 (d) 15

RRB NTPC 28.03.2016 Shift : 3

Ans : (c) We know that,

$$\text{Mean} = \frac{\text{Sum of all observation}}{\text{Total number of observation}}$$

Mean of 20 observation is 15.5

So, Sum of all observation $= 20 \times 15.5$
 $= 310$

Later it was found that 24 was written by mistake instead of 42.

Sum of observation after correction $= 310 + 24 - 42$
 $= 292$

Hence, correct mean $= \frac{292}{20} = 14.6$

31. The mean of 22 observations is 10. When two more observations is included then new mean becomes 11. What will be the mean of two new observations?

- (a) 19 (b) 20
(c) 21 (d) 22

RRB NTPC 19.04.2016 Shift : 1

Ans : (d) Mean of two new observation

$$= \frac{24 \times 11 - 22 \times 10}{2}$$

$$= \frac{264 - 220}{2} = \frac{44}{2} = 22$$

32. The mean of 8 observations is 10. Three more observations is added the new mean becomes 12. Find out the mean of three new observations?

- (a) 16 (b) 18
(c) 17.33 (d) 15

RRB NTPC 16.04.2016 Shift : 2

Ans : (c) Total sum of 8 observations $= 8 \times 10 = 80$
Sum of observation on including three other observations

$$= 11 \times 12 = 132$$

\therefore Sum of three new observations $= 132 - 80 = 52$

So mean of three new observations $= \frac{52}{3} = 17.33$

33. Find out the mean of the given below data-

$$1, \frac{1}{2}, \frac{1}{2}, \frac{3}{4}, \frac{1}{4}, 2, \frac{1}{2}, \frac{1}{4}, \frac{3}{4}$$

- (a) $\frac{15}{18}$ (b) $\frac{13}{18}$
(c) $\frac{7}{9}$ (d) $\frac{8}{9}$

RRB NTPC 11.04.2016 Shift : 1

Ans : (b) Mean = $\frac{\text{Sum of numbers}}{\text{number of terms}}$

$$= \frac{1 + \frac{1}{2} + \frac{1}{2} + \frac{3}{4} + \frac{1}{4} + 2 + \frac{1}{2} + \frac{1}{4} + \frac{3}{4}}{9}$$

$$= \frac{4 + 2 + 2 + 3 + 1 + 8 + 2 + 1 + 3}{9} = \frac{26}{9} = \frac{13}{4.5}$$

34. If the mean of the given data 18, 16, 22, 13, ? is 16 then find the value of '?'.
 (a) 9 (b) 11
 (c) 10 (d) 12

RRB NTPC 06.04.2016 Shift : 1

Ans : (b) From question—

$$\text{Mean} = \frac{18 + 16 + 22 + 13 + ?}{5}$$

$$16 = \frac{69 + ?}{5} \Rightarrow 69 + ? = 16 \times 5$$

$$? = 80 - 69 = 11$$

35. The mean length of 6 rods is 44.2 cm. If the mean length of 5 rods is 46 cm. then what is the value of length of the 6th rods?
 (a) 35 (b) 35.2
 (c) 35.1 (d) 35.5

RRB NTPC 30.04.2016 Shift : 3

Ans : (b) Mean length of 6 rods = 44.2 cm.
 Total length of 6 rods = $44.2 \times 6 = 265.2$
 Mean length of 5 rods = 46 cm
 Total length of 5 rods = $46 \times 5 = 230$
 Length of 6th rod = $265.2 - 230 = 35.2$ cm

36. The mean of 9 observations is 18. Four more observations is added, the new mean becomes 19. What will be the mean of four new observations?
 (a) 21.25 (b) 20.25
 (c) 19 (d) 22

RRB NTPC 22.04.2016 Shift : 3

Ans : (a) Sum of 9 observations = $18 \times 9 = 162$
 Sum of 13 observations = $19 \times 13 = 247$
 So mean of four new observations = $\frac{247 - 162}{4}$

$$= \frac{85}{4} = 21.25$$

37. Find out the mean of first 6 prime numbers?
 (a) $14/3$ (b) 3
 (c) $41/6$ (d) $13/2$

RRB NTPC 29.03.2016 Shift : 1

Ans : (c) First 6 prime numbers = 2, 3, 5, 7, 11, 13

$$\therefore \text{Mean} = \frac{2 + 3 + 5 + 7 + 11 + 13}{6} = \frac{41}{6}$$

38. If the mean of 10, 4, 1, 15, 15, x, 12 and 14 is 10. Find the value of X.
 (a) 7 (b) 8
 (c) 10 (d) 9

RRB ALP CBT-2 Mec. - Diesel 23-01-2019 (Shift-I)

Ans. (d) : According to the question,
 Mean = $\frac{\text{Sum of total observations}}{\text{Number of total observations}}$

$$10 = \frac{10 + 4 + 1 + 15 + 15 + x + 12 + 14}{8}$$

$$80 = 71 + x$$

$$x = 9$$

39. Find the mean value of 2, 5, 8, 14, 21?

- (a) 9.5 (b) 9
 (c) 8.5 (d) 10

RRB ALP CBT-2 Trade (Fitter) 21-01-2019 (Shift-I)

Ans. (d) : From question—

$$\text{Mean} = \frac{\text{Sum of total observations}}{\text{No of total observations}}$$

$$= \frac{2 + 5 + 8 + 14 + 21}{5}$$

$$= \frac{50}{5}$$

$$= 10$$

40. If the mean value of height of 12 males is 1.70 m and that of 8 females is 1.60 m. Then what is the sum (in meters) of the total height of 8 females?

- (a) 12.9 (b) 12.8
 (c) 12.4 (d) 13

RRB NTPC 19.01.2017 Shift : 1

Ans : (b) Sum = number \times mean

$$\text{The sum of the height of 8 females} = 8 \times 1.60 = 12.8\text{m}$$

Type - 2

Problems Based on Median of Data

41. What will be the median of the given data?

1, 1.1, 2.3, 0.1, 0.9, 5, 3.9, 2.5, 4.2, 4.6

- (a) 2.6 (b) 2.4
 (c) 2.5 (d) 2.3

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (b) : On arranging the data in ascending order \Rightarrow

0.1, 0.9, 1, 1.1, 2.3, 2.5, 3.9, 4.2, 4.6, 5

Number of term = 10 (even)

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} + \left(\frac{n}{2} + 1\right)^{\text{th}}}{2}$$

$$\text{Median} = \frac{\frac{10}{3}^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}}{2}$$

$$= \frac{2.3 + 2.5}{2} = 2.4$$

42. Given are the scores of a batsman in the last 10 innings. Find the median score of the batsman in these innings.

65, 180, 81, 6, 63, 27, 122, 8, 165, 50

- (a) 63 (b) 64.5
(c) 65 (d) 64

RRB NTPC (Stage-2) 17/06/2022 (Shift-III)

Ans. (d) : On arranging the given observation in ascending order

6, 8, 27, 50, 63, 65, 81, 122, 165, 180

$n = 10$ (even)

$$\begin{aligned}\text{Median} &= \frac{\frac{n}{2}^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2} \\ &= \frac{5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}}{2} \\ &= \frac{63 + 65}{2} = 64\end{aligned}$$

43. What is the median of 15, 2, 7, 8, 11, 5 and 14?

- (a) 8 (b) 7.5
(c) 7 (d) 9.5

RRB NTPC (Stage-II) -12/06/2022 (Shift-II)

Ans. (a) : On arranging the numbers in ascending orders-

2, 5, 7, 8, 11, 14, 15 (odd)

$$\begin{aligned}\text{Median} &= \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term (Where } n = \text{number of terms)} \\ &= \frac{(7+1)^{\text{th}}}{2} = \frac{8^{\text{th}}}{2} = 4^{\text{th}} \text{ term} = 8\end{aligned}$$

44. Find the median of the numbers given below:

2, 7, 5, 6, 7, 5, 4, 4, 0, 3, 0, 3, 1, 1, 3

- (a) 3.5 (b) 4.5
(c) 3 (d) 4

RRB NTPC (Stage-II) -13/06/2022 (Shift-I)

Ans. (c) : On arranging the numbers in ascending order-

0, 0, 1, 1, 2, 3, 3, 3, 4, 4, 5, 5, 6, 7, 7

$N = 15$ (Odd number)

$$\begin{aligned}\text{Required median} &= \left(\frac{15+1}{2}\right)^{\text{th}} \text{ term} \\ &= 8^{\text{th}} \text{ term} \\ &= 3\end{aligned}$$

45. If an observation 70 is removed from the data 60, 68, 70, 72, 74, 76, 78, 80, then the median is increased by:

- (a) 0.5 (b) 1.5
(c) 2 (d) 1

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (d) : Given observations- 60, 68, 70, 72, 74, 76, 78, 80 Number of term = 8 (even)

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$\begin{aligned}&= \frac{\left(\frac{8}{2}\right)^{\text{th}} \text{ term} + \left(\frac{8}{2} + 1\right)^{\text{th}} \text{ term}}{2} \\ &= \frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2} \\ &= \frac{72 + 74}{2} \\ &= \frac{146}{2} \\ \text{Median} &= 73\end{aligned}$$

Number of term on removing 70 = 7 (odd)

$$\begin{aligned}\therefore \text{Median} &= \frac{n+1}{2}^{\text{th}} \text{ term} \\ &= \frac{7+1}{2} = 4^{\text{th}} \text{ term} \\ &= 74 \\ \text{Then, increased median} &= 74 - 73 \\ &= 1\end{aligned}$$

46. The median of the data in ascending order 7, 11, 12, $(x - y)$, $(x + y)$, 20, 21, 29 is 16. Find the value of x .

- (a) 15 (b) 14
(c) 12 (d) 16

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (d) : Accord

7, 11, 12, $(x - y)$, $(x + y)$, 20, 21, 29

Median (M) = 16

Number of terms (n) = 8

Then, Median (M) \Rightarrow

$$\begin{aligned}16 &= \frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2} \\ 16 &= \frac{x - y + x + y}{2} \\ 16 &= \frac{2x}{2} \\ x &= 16\end{aligned}$$

Hence, $x = 16$.

47. What is the median for the following series?

2, 5, 4, 1, 8

- (a) 4 (b) 3.5
(c) 7 (d) 4.5

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (a) : On arranging the above series in ascending order-

1, 2, 4, 5, 8

Where $n = 5$ (Odd number)

$$\begin{aligned}\text{Median} &= \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term} = \left(\frac{5+1}{2}\right)^{\text{th}} = 3^{\text{rd}} \text{ term} \\ \text{i.e. Median} &= 4\end{aligned}$$

48. In the given data if 30 is replaced by 100 then find the difference of the two medians.

80, 90, 40, 30, 20, 10, 70, 60, 50

- (a) 60 (b) 50
(c) 10 (d) 40

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (c) : 80, 90, 40, 30, 20, 10, 70, 60, 50

On Writing in ascending order to the given number,
10, 20, 30, 40, 50, 60, 70, 80, 90

Where, $n = 9$

$$\text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term} \quad [\because n = \text{odd number}]$$

$$= \frac{9+1}{2} \text{ term} = \frac{10}{2} \text{ term} = 5^{\text{th}} \text{ term}$$

\therefore Median = 50

According to the question, putting 100 in place of 30

Given data will as follows -10, 20, 40, 50, 60, 70, 80, 90, 100

$$\text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term} = \left(\frac{9+1}{2} \right)^{\text{th}} \text{ term} = \frac{10}{2} \text{ term}$$

= 5th term

Median = 60

Hence, Required difference = 60 - 50
= 10

49. The median of 4, 4, 5, 7, 6, 7, 7, 12, 3 :

- (a) 4 (b) 6
(c) 5 (d) 7

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (b) : On writing the numbers in ascending order

3, 4, 4, 5, 6, 7, 7, 7, 12

No. of terms = odd

$$\text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term}$$

$$= \left(\frac{9+1}{2} \right)^{\text{th}} \text{ term} = 5^{\text{th}} \text{ term}$$

Hence, Median = 6

50. What is the median of the following data?

78, 56, 22, 34, 45, 54, 39, 68, 54, 84

- (a) 54 (b) 53
(c) 55 (d) 51

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question,

Number of term = 10 (even)

On arranging the number in ascending order-

22, 34, 39, 45, 54, 54, 56, 68, 78, 84

$$\text{Median} = \frac{\frac{n}{2} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{\frac{10}{2} \text{ term} + \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}}{2} = \frac{54 + 54}{2} = 54$$

51. Find the median of 7, 14, 13, 12, 20, 11, 15 and 8.

- (a) 11 (b) 12.5
(c) 11.5 (d) 12

RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (b) : 7, 14, 13, 12, 20, 11, 15, 8

On arranging the numbers in ascending order- 7, 8, 11, 12, 13, 14, 15, 20

Number of terms (n) = 8

Note- If the series of numbers are odd then to calculate median, arrange the series in ascending/descending order and the number which is positioned in between would be the median. If the numbers are in even then add the 2 numbers which are positioned in between and divide it by 2.

If even number

$$\text{then Median} = \frac{\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term}}{2}$$

$$\begin{aligned} \text{Median} &= \frac{\frac{8}{2} \text{ term} + \left(\frac{8}{2} + 1 \right)^{\text{th}} \text{ term}}{2} \\ &= \frac{12 + 13}{2} = \frac{25}{2} = 12.5 \end{aligned}$$

52. The given data is arranged in ascending order and its median is 17. Find the value of x.

8, 10, 12, 15, x, x+2, 20, 25, 30, 32

- (a) 16 (b) 18
(c) 19 (d) 17

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (a) : 8, 10, 12, 15, x, x+2, 20, 25, 30, 32

n = 10 (Even)

$$\text{Median for even terms} = \frac{\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term}}{2}$$

$$\therefore \text{Median} = \frac{\frac{10}{2} \text{ term} + \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term}}{2} = \frac{x + (x+2)}{2}$$

$$\begin{aligned} \therefore 17 &= \frac{(2x+2)}{2} \\ 17 &= x + 1 \\ x &= 16 \end{aligned}$$

53. The following observations are arranged in ascending order. If the median of the data is 19, then find the value of x.

6, 9, 15, x + 4, x + 8, x + 12, 30, 32

- (a) 13 (b) 8
(c) 10 (d) 5

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

6, 9, 15, (x + 4), (x + 8), (x + 12), 30, 32 Number of terms (n) = 8 (even)

$$\Rightarrow \text{Median} = \frac{\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term}}{2}$$

$$19 = \frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2}$$

$$38 = x + 4 + x + 8$$

$$26 = 2x$$

$$x = 13$$

54. The digits given below are arranged in ascending order. If their median is 10, then find the value of p.

3, 5, 6, 2p + 3, 3p + 2, 15, 25, 51

- (a) 2 (b) 3
(c) 27.5 (d) 38

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (b) When the number of terms is even then

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

Where n = number of term.

Here n = 8 and median = 10 (Given)

$$10 = \frac{\left(\frac{8}{2}\right)^{\text{th}} \text{ term} + \left(\frac{8}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$10 = \frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2}$$

$$10 = \frac{2p + 3 + 3p + 2}{2}$$

$$5p = 20 - 5 = 15$$

$$p = \frac{15}{5} = 3$$

55. Find the median of 45, 76, 32, 58, 16, 27, 64 and 35.

- (a) 35 (b) 45
(c) 40 (d) 42

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (c) : On arranging the number in ascending order, 45, 76, 32, 58, 16, 27, 64 and 35

16, 27, 32, 35, 45, 58, 64, 76, n = 8 (even),

No. of term = n

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{\frac{8}{2}^{\text{th}} \text{ term} + \left(\frac{8}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2}$$

$$\text{Median} = \frac{35 + 45}{2} = \frac{80}{2}$$

$$\boxed{\text{Median} = 40}$$

56. The median of a set of 7 distinct observation is 21.5. If each of the largest 3 observations of the set is increased by 4, then the median of the new set -

- (a) will be four times the original median
(b) will remain the same as that of the original set
(c) will decrease by 4
(d) will increase by 4

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (b) : The median of seven different observations writing them in ascending order $\frac{7+1}{2}$ then will be equal to 4th term. So if three largest term i.e. 5th, 6th and 7th term of the number written in ascending order is increased by 4 then there is no change in the median of 4th term nor their order will change i.e. median will remain same as the original median.

57. What will be the median of the given following data-

7, 21, 2, 17, 3, 13, 7, 4, 9, 7, 9

- (a) 4 (b) 17
(c) 7 (d) 9

RRB NTPC 17.01.2017 Shift-3

Ans : (c) On arranging the number in ascending order to the given data-

2, 3, 4, 7, 7, 7, 9, 9, 13, 17, 21

n = 11 (odd)

$$\text{median} = \left(\frac{11+1}{2}\right)^{\text{th}} \text{ term} = 6^{\text{th}} \text{ term} = 7$$

58. Find the median of the given following data-

9, 0, 2, 8, 5, 3, 5, 4, 1, 5, 2, 7

- (a) 5 (b) 6.5
(c) 4.5 (d) 4

RRB NTPC 04.04.2016 Shift : 2

Ans : (c) On arranging the number in ascending order given below.

0, 1, 2, 2, 3, 4, 5, 5, 5, 7, 8, 9

n = 12 (even)

$$\text{Median} = \frac{1}{2} \left[\left(\frac{12}{2}\right)^{\text{th}} \text{ term} + \left(\frac{12}{2} + 1\right)^{\text{th}} \text{ term} \right]$$

$$= \frac{1}{2} [6^{\text{th}} \text{ term} + 7^{\text{th}} \text{ term}] = \frac{1}{2} (4 + 5) = \frac{9}{2} = 4.5$$

59. The median of the following numbers arranged in ascending order is 2.5, so find x?

0, 0, 1, 1, 2, 2, x, 3, 3, 4, 5, 7

- (a) 2 (b) 3
(c) 4 (d) 0

RRB NTPC 03.04.2016 Shift : 2

Ans : (b) 0, 0, 1, 1, 2, 2, x, 3, 3, 4, 5, 7

n = 12 (even)

$$\text{Median} = \frac{1}{2} \left[\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term} \right]$$

$$2.5 = \frac{1}{2} \left[\left(\frac{12}{2}\right)^{\text{th}} \text{ term} + \left(\frac{12}{2} + 1\right)^{\text{th}} \text{ term} \right]$$

$$= \frac{1}{2} [6^{\text{th}} \text{ term} + 7^{\text{th}} \text{ term}]$$

$$2.5 = \frac{1}{2} [2 + x]$$

$$\Rightarrow 2 + x = 5$$

$$\Rightarrow x = 3$$

60. For the given following data what will be the median? 25, 23, 26, 29, 31, 39 and 11

- (a) 25 (b) 26
(c) 29 (d) 31

RRB NTPC 02.04.2016 Shift : 1

Ans : (b) On arranging the numbers in ascending order-

11, 23, 25, 26, 29, 31, 39

Number of terms = 7 (odd)

$$\therefore \text{Median} = \left(\frac{7+1}{2}\right)^{\text{th}} \text{ term} = 4^{\text{th}} \text{ term} = 26$$

61. Find the median of the given number- 55, 53, 59, 56, 61, 69, and 31

- (a) 55 (b) 56
(c) 59 (d) 61

RRB NTPC 02.04.2016 Shift : 2

Ans : (b) On arranging the numbers in ascending order-

31, 53, 55, 56, 59, 61, 69

n = 7 (odd)

$$\begin{aligned} \text{median} &= \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term} = \left(\frac{7+1}{2}\right)^{\text{th}} \text{ term} \\ &= 4^{\text{th}} \text{ term} \\ &= 56 \end{aligned}$$

62. What will be the median of the given number. 2, 3, 4, 3, 0, 5, 1, 1, 3, 2

- (a) 0 (b) 3
(c) 2.5 (d) 2.4

RRB NTPC 31.03.2016 Shift : 3

Ans : (c) 0, 1, 1, 2, 2, 3, 3, 4, 5
n = 10 (even)

$$\begin{aligned} \text{Median} &= \frac{1}{2} \left[\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} \left[\left(\frac{10}{2}\right)^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1\right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}] \\ &= \frac{1}{2} (2 + 3) = \frac{5}{2} = 2.5 \end{aligned}$$

63. If the numbers 3, 6, 7, 11, x, 15, 19, 20, 25 and 28 are in ascending order and median of these numbers are 13, then find the value of x?

- (a) 11 (b) 12
(c) 13 (d) 14

RRB NTPC 28.03.2016 Shift : 3

Ans : (a)

Given number 3, 6, 7, 11, x, 15, 19, 20, 25, 28
number of terms = 10 (even)

$$\therefore \text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$13 = \frac{\left(\frac{10}{2}\right)^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$13 = \frac{5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}}{2}$$

$$26 = x + 15$$

$$x = 11$$

64. What will be the median of the given data as follows -3, 4, 0, 4, -2, -5, 1, 7, 10, 5

- (a) 2 (b) 2.5
(c) 2.75 (d) 3

RRB NTPC 11.04.2016 Shift : 2

Ans : (b) On arranging the numbers in ascending order-

-5, -3, -2, 0, 1, 4, 4, 5, 7, 10

n = 10 (even)

$$\begin{aligned} \therefore \text{Median} &= \frac{1}{2} \left[\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term} \right] \\ &= \frac{1}{2} [5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}] = \frac{1}{2} \times [1 + 4] = 2.5 \end{aligned}$$

65. Find out the median of the given numbers as follows 3, 3, 5, 7, 8, 8, 8, 9, 11, 12, 12

- (a) 9 (b) 7
(c) 8 (d) 12

RRB NTPC 19.01.2017 Shift : 3

Ans : (c) On arranging the number in ascending order-
3, 3, 5, 7, 8, 8, 8, 9, 11, 12, 12

\Rightarrow number of terms (n) = 11 (odd)

$$\begin{aligned} \text{Median} &= \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term} \\ &= \left(\frac{11+1}{2}\right)^{\text{th}} \text{ term} = 6^{\text{th}} \text{ term} = 8 \end{aligned}$$

66. What will be the median of the given data- 87, 21, 53, 12, 86, 98, 23, 64, 87, 23, 23, 87, 56, 12, 53

- (a) 53.5 (b) 54
(c) 53 (d) 56.5

RRB NTPC 28.04.2016 Shift : 3

Ans : (c) On arranging in ascending order to the given data-

12, 12, 21, 23, 23, 23, 53, 53, 56, 64, 86, 87, 87, 87, 98

Total number of terms (n) = 15 (odd)

$$\text{Median} = \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term}$$

$$\text{So, median} = \left(\frac{15+1}{2}\right)^{\text{th}} \text{ term} = 8^{\text{th}} \text{ term}$$

$$\text{So, median} = 53$$

67. The median of the following term was determined: 32, 12, 23, 17, 28, 25, 43. Later it was found that 17 was written by mistake instead of 29. Now what will be the changeable median?

(a) 29 (b) 17
(c) 23 (d) 28

RRB NTPC 29.04.2016 Shift : 1

Ans : (d) Given term,

32, 12, 23, 17, 28, 25, 43

According to the question, 17 was replaced by 29

32, 12, 23, 29, 28, 25, 43

On arranging in ascending order to the given data–

12, 23, 25, 28, 29, 32, 43

$n = 7$ (odd)

$$\text{median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term}$$

$$= \left(\frac{7+1}{2} \right)^{\text{th}} \text{ term} = 4\text{th term} = 28$$

Type - 3

Problems Based on Mode of Data

68. What is the mode of the observations 5, 4, 4, 6, 7, 6, 9, 7, 6, 5?

(a) 4 (b) 7
(c) 5 (d) 6

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) : Given,

5, 4, 4, 6, 7, 6, 9, 7, 6, 5

∴ In the given observation 6 appears maximum number of times (3 times).

∴ Mode = 6

69. Find the mode of the following data.
15, 26, 15, 29, 19, 18, 19, 15, 24, 23, 15, 19

(a) 29 (b) 26
(c) 19 (d) 15

RRB NTPC (Stage-II) –16/06/2022 (Shift-II)

Ans. (d) : Given data– 15, 26, 15, 29, 19, 18, 19, 15, 24, 23, 15, 19

In the given observation, 15 appears maximum number of time = 4

Hence, mode = 15.

70. If the mode of the following data is 12, then find the value of k.

11, 15, 8, 9, k, 11, 12, 12, 15, 14

(a) 11 (b) 13
(c) 15 (d) 12

RRB NTPC 09.01.2021 (Shift-II) Stage Ist

Ans. (d) : The mode is the value that occurs the most often in a given set of data.

Hence, according to data = 11, 15, 8, 9, k, 11, 12, 12, 15, 14

$$k = 12$$

71. The marks obtained by 7 students in a class in mathematics are 43, 44, 65, 41, 53, 65, and 62. The mode of the data is:

(a) 53 (b) 65
(c) 41 (d) 62

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

43, 44, 65, 41, 53, 65, 62

The mode of the data = 65

72. The following are the weights (in kg) of 25 students:

58, 55, 53, 50, 53, 51, 52, 54, 53, 52, 54, 53, 58, 53, 59, 55, 53, 52, 51, 54, 53, 59, 55, 53, 52.

What is the most commonly observed weight (in kg)?

(a) 53 (b) 54
(c) 52 (d) 55

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (a) : The mode is the value that occurs the most often in a given set of data

58, 55, 53, 50, 53, 51, 52, 54, 53, 52, 54, 53, 58, 53, 59, 55, 53, 52, 51, 54, 53, 59, 55, 53, 52.

Hence, it is clear that mode is 53.

73. What will be the mode of the given data?

12, 1, 10, 1, 9, 3, 4, 9, 7, 9

(a) 9 (b) 12
(c) 1 (d) 7

RRB NTPC 17.01.2017 Shift-1

Ans : (a) In the given data , mode = 9 (3 times)

∴ Mode is the highest frequency number.

74. What will be the mode of the given data as follows– 32, 34, 35, 36, 35, 34, 33, 35, 33, 31 and 37

(a) 33 (b) 34
(c) 35 (d) 32

RRB NTPC 04.04.2016 Shift : 3

Ans : (c) 32, 34, 35, 36, 35, 34, 33, 35, 33, 31, 37

∴ In the given observation 35 appears maximum number of times.

75. What will be the mode of the given data as follows – 12, 14, 15, 16, 15, 14, 13, 15, 13, 11 and 17

(a) 13 (b) 14
(c) 15 (d) 12

RRB NTPC 03.04.2016 Shift : 3

Ans : (c) If the frequency of a number is the most frequent in the data, then that number is the mode of the given data.

So mode of data = 15

76. What will be the mode of the given data follows as– 2, 4, 5, 6, 5, 4, 3, 5, 3, 1 and 7

(a) 3 (b) 4
(c) 5 (d) 2

RRB NTPC 02.04.2016 Shift : 3

Ans : (c) 2, 4, 5, 6, 5, 4, 3, 5, 3, 1, 7

Frequency of 5 is highest in the given data.

∴ mode = 5

77. If the mode of the given data is 52, then find the value of x?

52, 45, 49, 54, 56, x-3, 56

- (a) 52 (b) 55
(c) 54 (d) 56

RRB NTPC 29.03.2016 Shift : 2

Ans : (b) Given, Mode = 52

Now According to the question,

$$x - 3 = 52$$

$$x = 55$$

78. What will be the mode of the given data-

$1, \frac{1}{2}, \frac{1}{2}, \frac{3}{4}, \frac{1}{4}, 2, \frac{1}{2}, \frac{1}{4}, \frac{2}{4}$

- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{3}{4}$ (d) 1

RRB NTPC 07.04.2016 Shift : 3

Ans : (b) \therefore frequency of $\frac{1}{2}$ is maximum (3) times in data.

$$\therefore \text{Mode} = \frac{1}{2}$$

Type - 4 Problems Based on Standard Deviation and Variance

79. If the mean is 25 and the standard deviation is 5 then the coefficient of variation is:

- (a) 48% (b) 27%
(c) 20% (d) 60%

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : Given,

$$\text{Mean} = 25$$

$$\text{Standard deviation} = 5$$

We know that,

$$\begin{aligned} \text{Coefficient of variation} &= \frac{\text{Standard deviation}}{\text{Mean}} \times 100 \\ &= \frac{5}{25} \times 100 = 20\% \end{aligned}$$

80. Calculate the standard deviation for the following data.

3, 4, 5, 6, 7

- (a) $\sqrt{2}$ (b) $\sqrt{6}$
(c) 2 (d) $\sqrt{3}$

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

$$\text{Ans. (a) : Standard deviation} = \sqrt{\frac{\sum |x - \bar{x}|^2}{n}}$$

where $x \rightarrow$ term

$\bar{x} \rightarrow$ mean

$n \rightarrow$ number of terms

$$\text{Mean } (\bar{x}) = \frac{\text{Sum of total terms}}{\text{Total number of terms}}$$

$$\bar{x} = \frac{3+4+5+6+7}{5} = \frac{25}{5} = 5$$

$$= \sqrt{\frac{\sum |x - \bar{x}|^2}{n}}$$

$$= \sqrt{\frac{(3-5)^2 + (4-5)^2 + (5-5)^2 + (6-5)^2 + (7-5)^2}{5}}$$

$$= \sqrt{\frac{4+1+0+1+4}{5}}$$

$$= \sqrt{\frac{10}{5}} = \sqrt{2}$$

81. The standard deviation of 12 values is 3. If each value is increased by 4, then find the variance of the new set of values.

- (a) 25 (b) 16
(c) 7 (d) 9

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (d) : Standard deviation of 12 values = 3

($\therefore \sigma =$ Standard deviation)

$$\text{Variance} = \sigma^2 = (3)^2 = 9$$

Note- No change in variance if each number increase by 4

82. If mean is 40 and standard deviation is 5 then C.V. (Coefficient of variation) is

- (a) 20% (b) 12.5%
(c) 5% (d) 100%

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (b) : Given,

$$\text{Mean} = 40, \text{ Standard deviation} = 5$$

$$\text{Coefficient of variation} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

$$= \frac{5}{40} \times 100 = 12.5\%$$

83. The mean of a distribution is 18 and the standard deviation is 4.5. What is the value of variance of coefficient?

- (a) 50% (b) 25%
(c) 100% (d) 75%

RRB NTPC 19.04.2016 Shift : 2

Ans : (b) Distribution mean = 18

$$\text{Standard deviation} = 4.5$$

$$\therefore \text{Variance on coefficient} = \frac{4.5}{18} \times 100\%$$

$$= \frac{450}{18} = 25\%$$

84. The mean of a distribution is 11 and the standard deviation is 5. What is the value of variance coefficient?

- (a) 45.45% (b) 35.35%
(c) 25.25% (d) 55.55%

RRB NTPC 18.04.2016 Shift : 1

Ans : (a)

$$\begin{aligned}\text{Variance of coefficient} &= \frac{\text{Standard deviation}}{\text{Mean}} \times 100\% \\ &= \frac{\sigma}{x} \times 100\% \\ &= \frac{5}{11} \times 100\% \\ &= 45.45\%\end{aligned}$$

85. If the standard deviation of a population is 8, then what will be its variance?

- (a) 64 (b) 16
(c) 32 (d) 24

RRB NTPC 18.04.2016 Shift : 2

Ans : (a) Standard deviation of variance coefficient = 8
Variance = (Standard deviation)²
= (8)² = 64

86. The mean of a distribution is 21 and the standard deviation is 7. Find the variance of coefficient?

- (a) 16.66% (b) 66.66%
(c) 33.33% (d) 100%

RRB NTPC 16.04.2016 Shift : 3

Ans : (c) Variance of coefficient = $\frac{7}{21} \times 100 = 33.33\%$

87. What will be the standard deviation of the given set {10, 11, 12, 9, 8}

- (a) 1 (b) $\sqrt{2}$
(c) 2 (d) $2\sqrt{2}$

RRB NTPC 31.03.2016 Shift : 2

Ans : (b) Mean (\bar{x}) = $\frac{\text{Sum of total terms}}{\text{Total number of terms}}$

$$\bar{x} = \frac{10+11+12+9+8}{5} = \frac{50}{5} = 10$$

$$\begin{aligned}\sum_{i=1}^5 (x_i - \bar{x})^2 &= (10-10)^2 + (11-10)^2 + (12-10)^2 + (9-10)^2 \\ &+ (8-10)^2 \\ &= 0 + 1 + 4 + 1 + 4 = 10\end{aligned}$$

$$\therefore \text{Standard deviation} = \sqrt{\frac{\sum_{i=1}^5 (x_i - \bar{x})^2}{N}} = \sqrt{\frac{10}{5}} = \sqrt{2}$$

88. If the standard deviation of the population is 13, then what will be the variance of the population?

- (a) 78 (b) 39
(c) 26 (d) 169

RRB NTPC 22.04.2016 Shift : 3

Ans : (d) Required variance = (standard deviation)²
= 13 × 13 = 169

89. If the standard deviation of a distribution is 6, then what is the value of variance?

- (a) 8 (b) 24
(c) 36 (d) 12

RRB NTPC 18.01.2017 Shift : 3

Ans : (c) Variance = (Standard deviation)²
= (6)² = 36

90. If the variance of a data set is 196, the standard deviation will be?

- (a) ± 14 (b) 14
(c) 96 (d) 98

RRB NTPC 11.04.2016 Shift : 1

Ans : (b) Standard deviation

$$= \sqrt{\text{variance}} = \sqrt{196} = 14$$

91. The variance of a data set is 169, then what will be the standard deviation?

- (a) ± 13 (b) 13
(c) 69 (d) 845

RRB NTPC 26.04.2016 Shift : 2

Ans : (b) Standard deviation = $\sqrt{\text{variance}}$

$$= \sqrt{169} = 13$$

92. In an observations $x_1, x_2, x_3, \dots, x_n$, frequency will be given as $f_1, f_2, f_3, \dots, f_n$.

What will be the standard deviation \bar{x}

$$\begin{aligned}\text{(a)} & \sqrt{\frac{\sum_{i=1}^n f_i (x_i - \bar{x})}{\sum_{i=1}^n f_i}} & \text{(b)} & \sqrt{\frac{\sum_{i=1}^n f_i (x_i - \bar{x})^2}{\sum_{i=1}^n f_i}} \\ \text{(c)} & \sqrt{\frac{\sum_{i=1}^n f_i (x_i^2 - \bar{x})}{\sum_{i=1}^n f_i}} & \text{(d)} & \sqrt{\sum_{i=1}^n f_i (x_i - \bar{x})}\end{aligned}$$

RRB NTPC 26.04.2016 Shift : 3

$$\text{Ans : (b) Standard deviation} = \sqrt{\frac{\sum_{i=1}^n f_i (x_i - \bar{x})^2}{\sum_{i=1}^n f_i}}$$

where \bar{x} = mean

93. The mean of a distribution is 80 and the standard deviation is 16. What is the value of variance coefficient?

- (a) 10% (b) 20%
(c) 40% (d) 60%

RRB NTPC 22.04.2016 Shift : 1

Ans : (b) Distribution mean = 80

Standard deviation = 16

$$\text{Variance of Coefficient} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100\%$$

$$= \left(\frac{16}{80} \right) \times 100\%$$

$$= \frac{1}{5} \times 100\%$$

$$= 20\%$$

94. Mean of given observation $x_1, x_2, x_3, \dots, x_n$ is \bar{x} . What will be the standard deviation of the n observation?

(a) $\sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})}{n}}$ (b) $\sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$
 (c) $\sqrt{\frac{\sum_{i=1}^n (x_i^2 - \bar{x})}{n}}$ (d) $\sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$

RRB NTPC 30.04.2016 Shift : 3

Ans : (b) Standard deviation (S.D.) = $\sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$
 where $\sum_{i=1}^n (x_i - \bar{x})^2 = \text{variables}$

95. Calculate the variance from the following data:
 3, 6, 5, 2, 4

- (a) 2.5 (b) 2.2
 (c) 2 (d) 3

RRB NTPC 02.03.2021 (Shift-II) Stage Ist

Ans. (c) : Variance $(\sigma)^2 = \frac{\sum (x_i - \bar{x})^2}{N}$
 Mean $(\bar{x}) = \frac{20}{5} = 4$

$$\frac{(x_i - \bar{x})^2}{N} = \frac{(3-4)^2 + (6-4)^2 + (5-4)^2 + (2-4)^2 + (4-4)^2}{5}$$

$$= \frac{(-1)^2 + (2)^2 + (1)^2 + (-2)^2 + (0)^2}{5}$$

$$= \frac{1+4+1+4}{5}$$

$$= \frac{10}{5} = 2$$

96. Find the variance of the following data points:
 6, 7, 5, 9, 12, 15

- (a) $\frac{37}{6}$ (b) $\frac{37}{3}$
 (c) $\frac{81}{3}$ (d) $\frac{67}{6}$

RRB NTPC 03.02.2021 (Shift-II) Stage Ist

Ans. (b) : Given data = 6, 7, 5, 9, 12, 15
 Variance $(\sigma^2) = \frac{\sum (X_i - M)^2}{n}$ [where, M = Mean]
 Mean of data $(M) = \frac{\text{Sum of data}}{\text{Sum of numbers}}$

$$= \frac{6+7+5+9+12+15}{6} = \frac{54}{6} = 9$$

 Variance $(\sigma^2) = \frac{\sum (x_i - M)^2}{n}$

$$= \frac{(6-9)^2 + (7-9)^2 + (5-9)^2 + (9-9)^2 + (12-9)^2 + (15-9)^2}{6}$$

$$= \frac{9+4+16+0+9+36}{6}$$

$$= 74/6 = 37/3$$

97. The variance of 20 observations is 5. If each observation is multiplied by 2, then the variance of the resulting observations will be

- (a) 2×5 (b) 2×5^2
 (c) 5 (d) $2^2 \times 5$

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (d) : Number of observations (n) = 20

$$\text{Variance} = \frac{1}{n} \sum (x_i - \bar{x})^2$$

$$5 = \frac{1}{20} \sum (x_i - \bar{x})^2$$

$$\sum (x_i - \bar{x})^2 = 100 \dots\dots(i)$$

If each observation is multiplied by 2 then new variance will be

$$= \frac{1}{n} \sum (2x_i - 2\bar{x})^2$$

$$\text{Now, Variance} = \frac{1}{20} \sum (x_i - \bar{x})^2 \times 4$$

From equation (i)

$$= \frac{1}{20} \times 100 \times 4$$

$$\text{Variance} = 20 = 2^2 \times 5$$

98. If the standard deviation of a population is 9.5, then what will be its variance?

- (a) 19 (b) 90.25
 (c) 81.25 (d) 93.25

RRB NTPC 19.04.2016 Shift : 1

Ans : (b) We know that,

$$\text{Variance} = (\text{Standard deviation})^2$$

$$= (9.5)^2$$

$$= 90.25$$

99. The variance of a given data is 324, then what will be the value of standard deviation?

- (a) ± 18 (b) 18
 (c) 324 (d) 162

RRB NTPC 07.04.2016 Shift : 2

Ans : (b) Standard deviation = $\sqrt{\text{Variance}}$

$$\therefore \text{Variance} = 324$$

$$\therefore \text{Standard deviation} = \sqrt{324}$$

$$= 18$$

100. If the standard deviation of a distribution is 9. Then find the value of variance.

- (a) 18 (b) 27
 (c) 81 (d) 36

RRB NTPC 28.04.2016 Shift : 2

Ans : (c) Variance = $(\text{Standard deviation})^2$

$$= (9)^2 = 81$$

Type - 5

Problems Based on Range

101. Let $f(x) = x^2$ in \mathbb{R} , then the range of f will be:
 (a) Whole numbers
 (b) Non negative numbers
 (c) Positive real numbers
 (d) Negative real numbers

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : The square of any number will be always positive real numbers.

$$\therefore f(x) = x^2$$

$$\Rightarrow \text{Range of } f = [0, \infty] = \mathbb{R}^+$$

Hence, the range of f will be positive real numbers.

102. The following are the weights (in kg) of 25 students:
 58, 55, 53, 50, 53, 51, 52, 54, 53, 52, 54, 53, 58, 53, 59, 55, 53, 52, 51, 54, 53, 59, 55, 53, 52

What is the range of the given data.

- (a) 6 (b) 8
 (c) 9 (d) 7

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : The range of the given data = $59 - 50 = 9$
 Formula Range (x) = Maximum Value – Minimum value

Now, From question – Maximum Value = 59 Minimum value = 50

103. What will be the range of the following data?
 6, 7, 8, 9, 5, 6, 7, 4, 8, 9, 5, 9
 (a) 2 (b) 3
 (c) 4 (d) 5

RRB NTPC 31.03.2016 Shift : 1

Ans : (d) Lowest limit = 4
 Highest limit = 9

$$\text{Range} = \text{highest limit} - \text{lowest limit} = 9 - 4 = 5$$

104. What will be the range of the following data?
 12, 11, 18, 28, 19, 13, 19, 18
 (a) 11 (b) 17
 (c) 18 (d) 19

RRB NTPC 30.03.2016 Shift : 2

Ans : (b) The difference between the highest and lowest values of the given data is called range.
 Range = $28 - 11 = 17$

105. The following information is $60 \sum x^2 = 18000$,
 $\sum x = 960$ variance is related to the size of a sample.
 (a) 55 (b) 44
 (c) 22 (d) 16

RRB NTPC 07.04.2016 Shift : 3

Ans : (b) Given,
 $60 \sum x^2 = 18000$

$$\sum x^2 = \frac{18000}{60} \Rightarrow \boxed{\sum x^2 = 300}$$

$$\therefore \sum x = 960$$

$$\text{Average of 60 terms} = \frac{960}{60} = 16$$

$$\sum x^2 = (16)^2 \Rightarrow \boxed{\sum x^2 = 256}$$

$$\therefore \text{Variance} = 300 - 256 = 44$$

106. What will be the range of the following data?
 3, 1, 4, 6, 5, 7, 3, 8, 1, 4
 (a) 3 (b) 8
 (c) 7 (d) 6

RRB NTPC 26.04.2016 Shift : 1

Ans : (c) According to the question–

$$\begin{aligned} \text{Range} &= \text{largest number} - \text{smallest number} \\ &= 8 - 1 = 7 \end{aligned}$$

Type - 6

Probability

107. Five salesmen, A, B, C, D and E, of a company are considered for a three member trade delegation to represent the company at an international trade conference. What is the probability that A gets selected?

- (a) $\frac{1}{5}$ (b) $\frac{3}{5}$
 (c) $\frac{2}{5}$ (d) $\frac{4}{5}$

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (b) : Probability of A, being selected

$$= \frac{\text{Favourable prospect}}{\text{Total prospect}}$$

$$= \frac{3 \times 2!}{5 \times 4!} = \frac{3}{5}$$

$$= \frac{{}^3C_1}{{}^5C_1} = \frac{2!}{5 \times 4!} = \frac{3}{5}$$

108. There are 20 people in a party. If every person shakes hand with every other person, then what will be the total number of handshakes?

- (a) 145 (b) 190
 (c) 180 (d) 155

RRB NTPC 08.02.2021 (Shift-II) Stage I

Ans. (b) : The total number of handshakes = ${}^{20}C_2$

$$= \frac{20!}{2! \times (20-2)!} \quad \left\{ \therefore {}^nC_r = \frac{n!}{r!(n-r)!} \right\}$$

$$= \frac{20!}{2! \times 18!}$$

$$= \frac{20 \times 19 \times 18!}{2 \times 18!}$$

$$= 190$$

109. A bag contains cards numbered between 33 and 92. If one card is drawn from the bag, the probability of the number on the drawn card is a perfect square is:

- (a) $-\frac{1}{12}$ (b) $\frac{5}{59}$
 (c) $\frac{1}{15}$ (d) $\frac{4}{59}$

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (c) : Perfect square numbers between 33 and 92 are 36, 49, 64 and 81

We know that,

$$\text{Probability } P(E) = \frac{n(E)}{n(S)}$$

$$l = a + (n-1)d$$

Where d = last term

a = First term

n = Total number

d = Difference

$$92 = 33 + (n-1)d$$

$$92 - 33 + 1 = n$$

$$60 = n$$

$$P(E) = \frac{4}{60}$$

$$\Rightarrow P(E) = \frac{1}{15}$$

- 110. Kings and Queens of black colour are taken out from a deck of 52 playing cards. A card is drawn from the remaining well-shuffled cards. Probability of getting a spade card is:**

- (a) $\frac{11}{13}$ (b) $\frac{11}{48}$
(c) $\frac{11}{52}$ (d) $\frac{1}{4}$

RRB NTPC 01.04.2021 (Shift-I) Stage Ist

Ans. (b) : The total number of cards in a deck of cards = 52

The number of black cards = 13+13 = 26

Number of cards remaining after drawing the black colour of king and queen = 48

Number of spades in the remaining cards = 11

$$\text{Probability of drawn cards being spades} = \frac{11}{48}$$

- 111. A box contains 2 black, 6 green and 4 yellow balls. If 2 balls are picked up at random, the probability that both are green is:**

- (a) $\frac{1}{6}$ (b) $\frac{1}{22}$
(c) $\frac{3}{11}$ (d) $\frac{5}{22}$

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (d) : Total balls = 2 + 6 + 4 = 12

$$\begin{aligned} \text{Probability of green balls} &= \frac{{}^6C_2}{{}^{12}C_2} = \frac{\frac{6 \times 5}{2 \times 1}}{\frac{12 \times 11}{2 \times 1}} \\ &= \frac{30}{12 \times 11} \\ &= \frac{5}{22} \end{aligned}$$

- 112. A dice is cast twice, and the sum of the appearing numbers is 10. The probability that the number 5 has appeared at least once is:**

- (a) $\frac{2}{3}$ (b) $\frac{1}{4}$
(c) $\frac{1}{2}$ (d) $\frac{1}{3}$

RRB NTPC 13.03.2021 (Shift-II) Stage Ist

Ans. (d) : On throwing the dice twice

No. of probability of appearing the sum "10"

$$= (4,6) (6,4) (5,5)$$

$$n(S) = 3$$

Probability that number '5' has appeared at least "once"

$$= (5, 5)$$

$$n(E) = 1$$

$$P(E) = \frac{n(E)}{n(S)} = \frac{1}{3}$$

- 113. A letter of english alphabet is chosen at random. Probability of getting a vowel is:**

- (a) $\frac{5}{26}$ (b) $\frac{5}{21}$
(c) $\frac{1}{4}$ (d) $\frac{6}{25}$

RRB NTPC 03.03.2021 (Shift-II) Stage Ist

Ans. (a) :

Total letter in English alphabet n(s) = 26

Number of vowels = n(E) = 5

Probability of selected letter to be vowel

$$\begin{aligned} &= \frac{n(E)}{n(s)} \\ &= \frac{5}{26} \end{aligned}$$

- 114. If 9 students are standing on a circular path, then the probability that 2 of them are always standing together is:**

- (a) $\frac{2}{7}$ (b) $\frac{1}{3}$
(c) $\frac{1}{4}$ (d) $\frac{7}{8}$

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (c) : As per the question,

Take 2 particular people as 1 unit

Then total outcomes (s) = (9-1)! = 8!

Hence,

$$\text{Total number of events} = 7! \times 2!$$

$$\text{Required probability} = \frac{7 \times 2!}{8!} = \frac{7 \times 2}{8 \times 7!} = \frac{2}{8} = \frac{1}{4}$$

- 115. A box contains 6 white, 2 black and 3 red balls. if a ball is drawn at random, what is the probability that it will not be white?**

- (a) $\frac{5}{11}$ (b) $\frac{6}{11}$
(c) $\frac{5}{6}$ (d) $\frac{6}{5}$

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (a) : Total Ball = 6 + 2 + 3 = 11

Probability of an event P(E)

$$= \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

Number of favorable outcome of ball will not be white = 5

Total number of outcomes = Total Balls

$$\text{So, probability of ball that will not be white} = \frac{5}{11}$$

116. There are 30 balls in a bag on which the numbers 1, 2, 3,.....30 are marked, one ball is drawn randomly from the bag. Find the probability that the number marked on the ball taken out of the bag is divisible by 4 or 6.

- (a) $\frac{1}{15}$ (b) $\frac{2}{5}$ (c) $\frac{3}{10}$ (d) $\frac{1}{3}$

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (d) : The number of balls = 30
 $\therefore n(S) = 30$
 The balls marked remove divisible by 4 or 6.
 $= 4, 6, 8, 12, 16, 18, 20, 24, 28$ and 30
 $n(A) = 10$
 Hence required probability $P(A) = \frac{n(A)}{n(S)} = \frac{10}{30} = \frac{1}{3}$

117. There are 20 balls in a bag which are numbered 1, 2, 3,.....20. Find the probability that the number marked on the ball taken out of the bag is divisible by 3 or 5.

- (a) $\frac{1}{10}$ (b) $\frac{9}{20}$
 (c) $\frac{2}{5}$ (d) $\frac{1}{2}$

RRB NTPC 06.04.2021 (Shift-II) Stage Ist

Ans. (b) : Number of balls = 20
 $\therefore n(s) = 20$
 The number of balls marked by a number divisible by 3 or 5
 $= 3, 5, 6, 9, 10, 12, 15, 18$ and 20
 $\therefore n(A) = 9$
 Required probability $P(A) = \frac{n(A)}{n(s)} = \frac{9}{20}$

118. Two cards are drawn from a pack of 52 cards. The probability that out of 2 cards, one card is red and one card is black is :

- (a) $\frac{26}{51}$ (b) $\frac{13}{25}$
 (c) $\frac{25}{51}$ (d) $\frac{1}{2}$

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (a) : The total number of cards is = 52 which has 26 red cards and 26 black cards.

$$n(S) = 52C_2 = \frac{52 \times 51}{2 \times 1} = 26 \times 51$$

and

$$n(E) = 26C_1 \times 26C_1 \\ = 26 \times 26$$

$$P(E) = \frac{n(E)}{n(S)}$$

Where,

$P(E)$ = Probability
 $n(E)$ = Events to be founds
 $n(S)$ = Total possible events

$$P(E) = \frac{26 \times 26}{26 \times 51} = \frac{26}{51}$$

119. If tossing three coins at a time, the probability of getting at least one heads is:

- (a) $\frac{1}{2}$ (b) $\frac{1}{8}$
 (c) $\frac{3}{8}$ (d) $\frac{7}{8}$

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (d) : Probability of results in tossing three coins at a time = {HHH, TTT, THT, TTH, HHT, HTH, THH, HTT}

So number of probable results at tossing three coins = 8

Now, Probable results of getting at least one head = {HHH, THT, TTH, HHT, HTH, THH, HTT}

So, number of probable results of getting at least one head = 7

Hence, Probability of getting at least one head = $\frac{7}{8}$

120. If a box contains 3 white cushions, 4 red cushions and 5 blue cushions. What is the probability of selection of one white or blue cushion?

- (a) $\frac{2}{3}$ (b) $\frac{3}{4}$
 (c) $\frac{1}{4}$ (d) $\frac{1}{9}$

RRB NTPC 28.04.2016 Shift : 2

Ans : (a) White cushion = 3
 red cushion = 4
 blue cushion = 5

$$\text{Probability} = \frac{\text{favourable events}}{\text{Total events}}$$

$$\text{Total events} = {}^{12}C_1$$

favourable probabilities to choose 1 white or 1 blue cushion = ${}^3C_1 + {}^5C_1$

$$\text{So probability} = \frac{{}^3C_1 + {}^5C_1}{{}^{12}C_1} \quad \left[{}^nC_r = \frac{n!}{r!(n-r)!} \right]$$

$$= \frac{\frac{3!}{1!(3-1)!} + \frac{5!}{1!(5-1)!}}{\frac{12!}{1!(12-1)!}} \\ = \frac{\frac{3 \times 2 \times 1}{1 \times 2} + \frac{5 \times 4 \times 3 \times 2 \times 1}{1 \times 4 \times 3 \times 2 \times 1}}{\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{1 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}}$$

$$= \frac{\frac{3 \times 2}{2} + \frac{5 \times 4}{4}}{\frac{12 \times 11}{11}} = \frac{\frac{3 \times 2}{2} + \frac{5 \times 4}{4}}{12} = \frac{3 + 5}{12} = \frac{8}{12} = \frac{2}{3}$$

Note :- use $\boxed{+}$ for 'or' and $\boxed{\times}$ for 'and'.

121. When a coin is tossed once, what are the probability of coming Head?

- (a) 1 (b) $\frac{1}{2}$
 (c) 2 (d) Zero

RRB NTPC 29.04.2016 Shift : 1

Ans : (b) Head favorable probability when a coin is tossed

$$\text{Required probability} = \frac{\text{Favourable events}}{\text{total events}} = \frac{1}{2}$$

So probability to come Head = $\frac{1}{2}$

122. If the difference between the mean and the mode of certain observations is 69, then the difference between the mean and the median is ____.

(a) 24 (b) 21
(c) 23 (d) 22

RRB NTPC (Stage-II) 15/06/2022 (Shift-III)

Ans. (c) : We know that,

$$\text{Mode} = 3 \times \text{Median} - 2 \times \text{Mean} \quad \dots(i)$$

According to the question,

$$\text{Mean} - \text{Mode} = 69 \quad \dots(ii)$$

$$\text{Mode} = \text{Mean} - 69$$

From equation (i),

$$3 \text{ Median} - 2 \text{ Mean} = \text{Mean} - 69$$

$$3 \text{ Mean} - 3 \text{ Median} = 69$$

$$3 (\text{Mean} - \text{Median}) = 69$$

$$\text{Mean} - \text{Median} = \frac{69}{3} = \boxed{23}$$

123. The maximum weight lifted by 750 participants are recorded and it is found that the Mean and the Median of this distribution are both more than the Mode. If the Mean and the Median are 184 Kg and 178 Kg respectively, then which of the following is the most likely value of the Mode (in Kg).

(a) 168 (b) 166
(c) 162 (d) 172

RRB NTPC (Stage-II) -13/06/2022 (Shift-II)

Ans. (b) : Given,

Mean of 750 participants = 184 kg
and Median of 750 participants = 178 kg
Mode = ?

$$\begin{aligned} \text{We know that, } \text{Mode} &= 3 \text{ Median} - 2 \text{ Mean} \\ &= 3 \times 178 - 2 \times 184 \\ &= 534 - 368 \\ &= 166 \end{aligned}$$

124. The numbers 4, 6, 10, x, 20, 24, 32 are arranged in ascending order. Find the value of x if their mean and their median are equal.

(a) 20 (b) 8
(c) 16 (d) 12

RRB NTPC (Stage-II) 17/06/2022 (Shift-III)

Ans. (c) :

$$\text{Mean} = \frac{4 + 6 + 10 + x + 20 + 24 + 32}{7}$$

$$= \frac{96 + x}{7}$$

$$\therefore \text{Number of terms} = 7$$

Hence, Median = middle term = (x)

According to the question,

Mean = Median

$$\therefore \frac{96 + x}{7} = x$$

$$6x = 96$$

$$x = 16$$

125. If the difference between the mode and median is 2, then find the difference between the median and mean (in the given order) using empirical relation.

(a) 1 (b) 2
(c) 4 (d) 3

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (a) : Given,

$$\text{Mode} - \text{Median} = 2 \quad \dots(i)$$

$$\therefore \text{Mode} = 3 \times \text{Median} - 2 \times \text{Mean} \quad \dots(ii)$$

From equation (i) and (ii) —

$$3 \times \text{Median} - 2 \times \text{Mean} - \text{Median} = 2$$

$$\Rightarrow 2 \times \text{Median} - 2 \times \text{Mean} = 2$$

$$\Rightarrow \text{Median} - \text{Mean} = 1$$

126. Sakshi attended to the following number of clients at the front desk during her internship for 15 days :

18, 20, 16, 17, 32, 12, 6, 16, 12, 13, 17, 28, 24, 45, 17.

Find the average of the mode and median of the given data.

(a) 19.5 (b) 34
(c) 18.25 (d) 17

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (d) : According to the question—

On arranging the data in ascending order

6, 12, 12, 13, 16, 16, 17, 17, 17, 18, 20, 24, 28, 32, 45

Mode = 17 (has come 3 times)

$$\text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term}$$

$$\text{Median} = \left(\frac{15+1}{2} \right)^{\text{th}} \text{ term} = 8^{\text{th}} \text{ term} = 17$$

$$\text{Average} = \frac{\text{Mode} + \text{Median}}{2} = \frac{17 + 17}{2} = 17$$

127. Given below is the marks obtained by 20 students in mathematics out of 30 marks.

7, 9, 12, 12, 13, 12, 14, 14, 14, 14, 15, 16, 17, 18, 18, 19, 20, 18, 20, 13. Then $(2 \times \text{median} - \text{mode})$ of the data is equal to:

(a) 14 (b) 18
(c) 12 (d) 0

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (a) : According to the question—

On arranging the given number in ascending order

7, 9, 12, 12, 12, 13, 13, 14, 14, 14, 14, 15, 16, 17, 18, 18, 18, 19, 20, 20

$$n = 20 (\text{even})$$

$$\text{Median} = \frac{\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n+2}{2} \right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{\left(\frac{20}{2} \right)^{\text{th}} \text{ term} + \left(\frac{20+2}{2} \right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{10^{\text{th}} \text{ term} + 11^{\text{th}} \text{ term}}{2}$$

$$= \frac{14+14}{2} = 14$$

$$\text{Mode} = 14$$

$$\therefore 2 \times \text{Median} - \text{Mode} = 2 \times 14 - 14 = 14$$

128. In the frequency distribution, if the mid-value of the class is 35 and the value of the lower boundary is 30, then the value of its upper boundary is:

- (a) 40 (b) 30
(c) 10 (d) 20

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (a) : According to the question,

$$\text{Mid-value} = \frac{\text{Upper limit} + \text{Lower limit}}{2}$$

$$35 = \frac{\text{Upper limit} + 30}{2}$$

$$\text{Upper limit} = 70 - 30 = 40$$

129. The mean of three numbers is 53. The range of this data set is 28 while the difference between the two smallest numbers is 8. The greatest of the three numbers is:

- (a) 71 (b) 72
(c) 73 (d) 69

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (d) : Let three numbers are x, y and z.

According to the question,

$$\therefore x + y + z = 53 \times 3 = 159 \quad \dots (i)$$

$$x - z = 28 \quad \dots (ii)$$

$$y - z = 8 \quad \dots (iii)$$

Putting the value of x from equation (ii) and value of y from equation (iii) in equation (i),

$$z + 28 + z + 8 + z = 159$$

$$3z = 159 - 36$$

$$3z = 123$$

$$z = 41$$

Putting the value of z in equation (ii) and (iii),

$$x = 28 + 41 = 69$$

$$y = 41 + 8 = 49$$

Hence, the greatest number = 69

130. If the standard deviation of a set of numbers is 3 and the arithmetic mean of these numbers is 6, what is the coefficient of variation of these numbers?

- (a) 75 (b) 125
(c) 100 (d) 50

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

Ans. (d) :

$$\text{Coefficient of variation} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

$$= \frac{3}{6} \times 100$$

$$\text{Coefficient of Variation} = 50$$

131. Find the median and the mode for the following set of numbers.

2, 2, 3, 5, 5, 5, 6, 8, 9

- (a) Median = 2, Mode = 5
(b) Median = 5, Mode = 2
(c) Median = 0, Mode = 9
(d) Median = 5, Mode = 5

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (d) : On arranging the data in ascending order.

2, 2, 3, 5, 5, 5, 6, 8, 9

Set of numbers \rightarrow 2, 2, 3, 5, 5, 5, 6, 8, 9

Number of term \rightarrow 9 (odd)

$$\text{Median} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term}$$

$$= \left(\frac{9+1}{2} \right)^{\text{th}}$$

$$= 5^{\text{th}} \text{ term}$$

Hence, median = 5

2, 2, 3, 5, 5, 5, 6, 8, 9

\therefore T value that occurs most often called mode

\therefore Mode = 5

132. Find the median and the mode of the following data:

2, 3, 5, 7, 2, 3, 3, 5, 7 and 9

- (a) 4, 3 (b) 3, 4
(c) 3, 3 (d) 4, 4

RRB NTPC 22.02.2021 (Shift-I) Stage Ist

Ans. (a) : The ascending order of the given data is given below.

2, 2, 3, 3, 3, 5, 5, 7, 7, 9

Number of terms (n) = 10

\therefore The number of terms is even,

$$\therefore \text{Median} = \frac{\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{\left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term}}{2} = \frac{5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}}{2}$$

$$\text{Median} = \frac{3+5}{2} = \frac{8}{2} = 4$$

The value that occurs most often called mode.

Hence, the mode of above data = 3

133. The mean of three number is 32. The range of this data set is 28 while the difference between the two smallest numbers is 8. The greatest of the three numbers is:

- (a) 52 (b) 51
(c) 50 (d) 48

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let the smallest number be x .
 Middle number = $x + 8$
 The greatest number = $x + 28$

According to question—

$$\Rightarrow x + x + 8 + x + 28 = 3 \times 32$$

$$\Rightarrow 3x + 36 = 96$$

$$\Rightarrow 3x = 60$$

$$\Rightarrow x = 20$$

Hence the greatest of the three number is $(20 + 28) = 48$

134. The mean and standard deviation of 100 observations were calculated as 40 and 5.1 respectively by a student who took 50 instead of 40 for one observation. What is the correct mean and standard deviation ?

- (a) 39.09, 5 (b) 39.9, 5.0
 (c) 39.0, 5 (d) 39.9, 5

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (d) : \bar{x} (mean) = 40, σ , (Standard deviation) 5.1, $n = 100$

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

$$\sum_{i=1}^{100} x_i = 40 \times 100$$

$$\sum_{i=1}^{100} x_i = 4000$$

Incorrect mean = $4000 - 50 + 40 = 3990$

$$\text{Correct mean} = \frac{\text{Incorrect mean}}{\text{Number of observations}} = \frac{3990}{100}$$

$$\text{Correct mean} = 39.9$$

$$\sigma = \sqrt{\frac{1}{n} \sum_{i=1}^n x_i^2 - (\bar{x})^2}$$

$$(5.1)^2 = \frac{1}{100} \sum_{i=1}^n x_i^2 - (40)^2$$

$$(26.01 + 1600) \times 100 = \sum_{i=1}^{100} x_i^2$$

$$\sum_{i=1}^{100} x_i^2 = 162601$$

$$= 162601 - (50)^2 + (40)^2$$

$$= 162601 - 2500 + 1600$$

$$= 161701$$

Correct Standard Deviation

$$= \sqrt{\frac{1}{n} \sum_{i=1}^n x_i^2 - (\bar{x})^2}$$

$$= \sqrt{\frac{161701}{100} - (39.9)^2}$$

$$= \sqrt{1617.01 - 1592.01}$$

$$= \sqrt{25}$$

Correct Standard Deviation = 5

135. Find the mode, if mean and median are 4 and 5 respectively.

- (a) 11 (b) 7
 (c) 5 (d) 9

RRB NTPC 05.02.2021 (Shift-I) Stage Ist

Ans. (b) : We know that—

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

$$= 3 \times 5 - 2 \times 4 \quad \left\{ \begin{array}{l} \because \text{Median} = 5 \\ \text{Mean} = 4 \end{array} \right.$$

$$= 15 - 8 = 7$$

136. There are three positive integers a , b and c such that their average is 35 and $a \leq b \leq c$. If the median is $(a + 18)$, find the least possible value of c .

- (a) 41 (b) 42
 (c) 39 (d) 40

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question—

$$\frac{a + b + c}{3} = 35$$

$$a + b + c = 105$$

$$a \leq b \leq c$$

$$b = a + 18$$

$$c = 105 - (2a + 18)$$

$$b \leq c$$

$$a + 18 \leq 105 - (2a + 18)$$

$$3a \leq 87 - 18$$

$$a \leq 69$$

$$a \leq 23 \text{ (since it must be an integer)}$$

$$\text{Now } C = 105 - (2a + 18)$$

$$C = 105 - (2 \times 23 + 18)$$

$$C = 105 - 64$$

$$= 41$$

137. Find the sum of mean, median and mode of the given data.

9, 35, 20, 25, 25, 15, 25

- (a) 75 (b) 72
 (c) 47 (d) 50

RRB NTPC 30.01.2021 (Shift-I) Stage Ist

Ans. (b) :

$$\text{Mean} = \frac{9 + 35 + 20 + 25 + 25 + 15 + 25}{7}$$

$$= \frac{154}{7} = 22$$

On arranging the data in ascending order

9, 15, 20, 25, 25, 25, 35

$N = 7$ terms (odd)

$$\text{Median} = \left(\frac{N+1}{2} \right)^{\text{th}} \text{ term}$$

$$= \left(\frac{7+1}{2} \right)^{\text{th}} \text{ term} = 4^{\text{th}} \text{ term}$$

Median = 25

Mode = The number that occurs the highest number of times.

$$= 25$$

$$\text{Sum of mean, median and mode} = 22 + 25 + 25 = 72$$

138. Let a set $S = \{1, 2, 2, 3, 3, 3, 4, 4, 4, 4\}$. Then the value of $4 \times \text{mean} + 2 \times \text{mode} - 8 \times \text{median}$ is :

- (a) -4 (b) 14
(c) 10 (d) 4

RRB NTPC 21.01.2021 (Shift-I) Stage Ist

Ans. (a) : Set = $\{1, 2, 2, 3, 3, 3, 4, 4, 4, 4\}$

Mode = 4

$$\text{Mean} = \frac{1+2+2+3+3+3+4+4+4+4}{10}$$

$$= \frac{30}{10} = 3$$

In case the data is even ($n = 10$)

$$\text{Median} = \frac{1}{2} \left[\left(\frac{n}{2} \right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1 \right)^{\text{th}} \text{ term} \right]$$

$$= \frac{1}{2} \left[\left(\frac{10}{2} \right)^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1 \right)^{\text{th}} \text{ term} \right]$$

$$= \frac{1}{2} (5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term})$$

$$= \frac{1}{2} (3 + 3) = \frac{1}{2} \times 6$$

$$= 3$$

Now, $4 \times \text{mean} + 2 \times \text{mode} - 8 \times \text{median}$

$$= 4 \times 3 + 2 \times 4 - 8 \times 3$$

$$= 12 + 8 - 24$$

$$= 20 - 24$$

$$= -4$$

139. The following are the weights (in kg) of 25 students:

58, 55, 53, 50, 53, 51, 52, 54, 53, 52, 54, 53, 58, 53, 59, 55, 53, 52, 51, 54, 53, 59, 55, 53, 52
Among the following options, what is the weight (in kg) that appears least number of times in the given data?

- (a) 52 (b) 58
(c) 50 (d) 54

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (c) : In the given weight of 25 students 50 kg is the weight that appears least number of times.

140. The following are the weights (in kg) of 25 students:

58, 55, 53, 50, 53, 51, 52, 54, 53, 52, 54, 53, 58, 53, 59, 55, 53, 52, 51, 54, 53, 59, 55, 53, 52

What is the weight (in kg) of the heaviest student?

- (a) 56 (b) 58
(c) 55 (d) 59

RRB NTPC 09.01.2021 (Shift-I) Stage Ist

Ans. (d) : In the given weight of 25 students 59 kg students is heaviest.

141. If the median and mean are 36 and 35 respectively, then find the mode.

- (a) 32 (b) 34
(c) 38 (d) 30

RRB NTPC 15.02.2021 (Shift-I) Stage Ist

Ans. (c) : Mode = $3 \times \text{median} - 2 \times \text{mean}$
 $= 3 \times 36 - 2 \times 35$
 $= 108 - 70$
 $= 38$

142. The mass of five meteorites found on earth are 23.5 kg, 15 kg, 20 kg, 22 kg and 16 kg. For this data, which of the following measures is 19.3 kg?

- (a) Mean (b) Mean deviation
(c) Median (d) Mode

RRB NTPC 11.02.2021 (Shift-I) Stage Ist

Ans. (a) : Mean = $\frac{\text{Sum of terms}}{\text{Number of terms}}$
 $= \frac{23.5 + 15 + 20 + 22 + 16}{5} = \frac{96.5}{5} = 19.3$

Hence 19.3 will be the value of mean.

143. For the data set 1, 2, 3, 5, 2, 3, 4, 6, 6, 8, 3, 4, 5 which of the following options is incorrect?

1, 2, 3, 5, 2, 3, 4, 6, 6, 8, 3, 4, 5

- (a) Mean = Mode (b) Mean = Median
(c) Median > Mode (d) Mode < Mean

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (a) : On arranging the data in ascending order.

1, 2, 3, 5, 2, 3, 4, 6, 6, 8, 3, 4, 5

In ascending order

1, 2, 2, 3, 3, 3, 4, 4, 5, 5, 6, 6, 8

No. of term (n) = 13 (odd)

$$\text{Median} = \left(\frac{13+1}{2} \right)^{\text{th}} \text{ term} \Rightarrow 7^{\text{th}} \text{ term} = 4$$

Mode = 3

$$\text{Mean} = \frac{\text{Sum of total terms}}{\text{Number of terms}}$$

$$= \frac{1+2+2+3+3+3+4+4+5+5+6+6+8}{13}$$

$$= \frac{52}{13} = 4$$

(a) Mean \neq Mods, $[4 \neq 3]$

(b) Mean = Median, $[4 = 4]$

(c) Mode < Median, $[3 < 4]$

(d) Mean > Mode, $[4 > 3]$

Therefore option (a) is wrong.

144. Find the difference between median and mode of the following data

2, 3, 5, 7, 2, 3, 3, 5, 7 and 9

- (a) 2 (b) 1
(c) -2 (d) -1

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (b) : On arranging the number in ascending order—
2, 2, 3, 3, 3, 5, 5, 7, 7, 9
Number of terms = 10 (even)

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{\left(\frac{10}{2}\right)^{\text{th}} \text{ term} + \left(\frac{10}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}}{2}$$

$$\text{median} = \frac{3 + 5}{2} \Rightarrow 4$$

Mode = the number which will have the highest frequency in the data
 \therefore Mode = 3
 Required difference = $4 - 3 = 1$

145. Find the sum of the mean and median of the given data

12, 10, 16, 18, 20, 26, 14, 28

- (a) 17 (b) 44
(c) 18 (d) 35

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (d) : On arranging the data in ascending order =
10, 12, 14, 16, 18, 20, 26, 28 ($n = 8$)

Median =

$$\left(\frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2} \right) = \left(\frac{\left(\frac{8}{2}\right)^{\text{th}} \text{ term} + \left(\frac{8}{2} + 1\right)^{\text{th}} \text{ term}}{2} \right)$$

$$\frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2} = \frac{16 + 18}{2} = 17$$

$$\text{Mean} = \frac{10 + 12 + 14 + 16 + 18 + 20 + 26 + 28}{8} = \frac{144}{8} = 18$$

Sum of median and mean = $17 + 18 = 35$

146. If mean = (3 median – mode)/p, then the value of p is :

- (a) 1 (b) 2
(c) $\frac{1}{3}$ (d) $\frac{1}{2}$

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : We know that,
2 mean = [3 median – mode]

$$\text{or mean} = \frac{3 \text{ median} - \text{mode}}{2} \dots\dots(1)$$

$$\text{Given that mean} = \frac{3 \text{ median} - \text{mode}}{p} \dots\dots(2)$$

Comparing equation (i) & (ii) we found
 $p = 2$

147. Mean of the number 2, 4, 5, 8, 2 and 3 is m. The numbers 4, 3, 3, 5, m, 3 and p have mean m+1, median q and mode r. What is the value of (p + q – r)?

- (a) 20 (b) 13
(c) 14 (d) 21

RRB NTPC 08.04.2021 (Shift-II) Stage Ist

$$\text{Ans. (c) : Mean} = \frac{\sum n}{N} = \frac{2 + 4 + 5 + 8 + 2 + 3}{6}$$

Mean = 4

Mean of 3, 3, 3, 4, 5, p, m is (m + 1)

$$m + 1 = \frac{3 + 3 + 3 + 4 + 5 + p + 4}{7} \quad [m = 4]$$

$$5 \times 7 = p + 22$$

$$35 = p + 22$$

$$p = 13$$

Given numbers = 4, 3, 3, 5, m, 3, p

After putting the value of m and p

4, 3, 3, 5, 4, 3, 13

On writing numbers in ascending order

3, 3, 3, 4, 4, 5, 13

$$\text{Median (q)} = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ term} \quad \{n = 7 \text{ odd}\}$$

$$= \left(\frac{7+1}{2} \right)^{\text{th}} \text{ term} = 4^{\text{th}} \text{ term}$$

$$\therefore q = 4$$

Mode (r) = The number having greater frequency is called mode

r = 3 (Here frequency of 3 is maximum)

$$\text{Hence: } p + q - r = 13 + 4 - 3 = 14$$

148. If mode of a series is greater than its mean by 9, then find the difference between the mode and the median.

- (a) 8 (b) 4
(c) 6 (d) 10

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (c) : Let, Mean = x

Then, mode = x + 9

According to the question,

Mode = 3 Median – 2 Mean

$$x + 9 = 3 \times \text{Median} - 2x$$

$$3x + 9 = 3 \times \text{Median}$$

$$\text{Median} = x + 3$$

$$\begin{aligned} \text{Mode} - \text{Median} &= (x + 9) - (x + 3) \\ &= x + 9 - x - 3 \\ &= 6 \end{aligned}$$

149. Find the difference between the median and the mean of the following data:

12, 20, 3, 14, 5, 8 and 15

- (a) 4 (b) 1
(c) 3 (d) 2

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (b) : Given data 12, 20, 3, 14, 5, 8 and 15

On arranging data in ascending order 3, 5, 8, 12, 14, 15, 20

$$\text{Median} = \left\{ \frac{(n+1)}{2} \right\}^{\text{th}} \text{ term}$$

$$= \left(\frac{7+1}{2} \right)^{\text{th}} \text{ term} \quad \{\because n = 7\}$$

$$= 4^{\text{th}} \text{ term}$$

Hence, Median = 12

Again, Mean = $\frac{\text{Sum of all terms}}{\text{No. of terms}}$

$$= \frac{3+5+8+12+14+15+20}{7} = \frac{77}{7} = 11$$

Mean = 11

According to the question-
 Required Difference = Median – Mean
 $= 12 - 11 = 1$

- 150. What will be the mean, mode and median of the given numbers– 3, 4, 5, 3, 6, 3, 4, 5, 3**
 (a) 4, 4, 4 (b) 4, 4, 3
 (c) 3, 4, 4 (d) 4, 3, 4

RRB NTPC 31.03.2016 Shift : 1

Ans : (d) On arranging the numbers in ascending order-

3, 3, 3, 3, 4, 4, 5, 5, 6
 Mean = $\frac{3+3+3+3+4+4+5+5+6}{9} = \frac{36}{9} = 4$

Mode = 3 (the highest frequent number)

∴ Number of terms (n) = 9 (odd)

∴ Median = $\left(\frac{n+1}{2}\right)^{\text{th}} \text{ term} = \left(\frac{9+1}{2}\right)^{\text{th}} \text{ term}$
 $= 5^{\text{th}} \text{ term} = 4$

Hence, Mean, mode and median is respectively 4, 3 and 5.

- 151. What will be the median, mode and mean of the given numbers?**
 9, 5, 8, 9, 9, 7, 8, 9, 8
 (a) 9, 9, 9 (b) 9, 8, 9
 (c) 8, 9, 8 (d) 8, 9, 9

RRB NTPC 31.03.2016 Shift : 2

Ans : (c) On arranging the numbers in ascending order-
 5, 7, 8, 8, 8, 9, 9, 9, 9
 ∴ Number of terms = 9 (odd)

∴ Median = $\left(\frac{n+1}{2}\right)^{\text{th}} \text{ term}$

$= \frac{9+1}{2} = 5^{\text{th}} \text{ term} = 8$

Mode = 9 (the highest frequent number)

Mean = $\frac{5+7+8+8+8+9+9+9+9}{9}$
 $= \frac{72}{9} = 8$

- 152. What will be the mode and median of the given digits–**
 8, 6, 8, 7, 8, 6, 8, 7, 6
 (a) 7 and 8 (b) 6 and 7
 (c) 8 and 7 (d) 6 and 8

RRB NTPC 30.03.2016 Shift : 1

Ans : (c) On arranging the numbers in ascending order-
 6, 6, 6, 7, 7, 8, 8, 8, 8

Mode = 8 (most frequent)

number of terms = 9 (odd)

∴ Median = $\left(\frac{9+1}{2}\right)^{\text{th}} = 5^{\text{th}} \text{ term} = 7$

Hence, Option (c) 8 and 7 is correct.

- 153. What will be the mean and mode of the given following data?**

1, 9, 5, 4, 2, 1, 9, 9, 2, 1, 9, 1, 2, 1

- (a) 4 and 9 (b) 5 and 1
 (c) 4 and 1 (d) 5 and 9

RRB NTPC 29.03.2016 Shift : 3

Ans : (c)

Mean = $\frac{1+9+5+4+2+1+9+9+2+1+9+1+2+1}{14}$

$= \frac{56}{14} = 4$

Mode of data = 1 (term of most frequent)

Hence, option (c) 4 and 1 is correct.

- 154. The mean of a distribution is 15 and the standard deviation is 5. What is the value of variance coefficient?**

- (a) 16.66% (b) 66.66%
 (c) 33.33% (d) 100%

RRB NTPC 12.04.2016 Shift : 3

Ans : (c)

Variance of coefficient = $\frac{\text{Standard deviation}}{\text{Mean}} \times 100\%$
 $= \frac{5}{15} \times 100$
 $= \frac{100}{3} = 33.33\%$

- 155. If the value of the mode is 14 and arithmetic mean is 5, then find the value of median?**

- (a) 8 (b) 18
 (c) 12 (d) 14

RRB NTPC 10.04.2016 Shift : 3

Ans : (a) mode = $(3 \times \text{median} - 2 \times \text{mean})$

$14 = 3 \times \text{median} - 2 \times 5$

$3 \times \text{median} = 14 + 10$

median = $\frac{24}{3} = 8$

- 156. What is the value of mode as well as median of the given following numbers–**

3, 4, 5, 5, 3, 6, 7, 3, 5, 5, 6

- (a) 5 and 5 (b) 3 and 5
 (c) 5 and 4 (d) 3 and 4

RRB NTPC 09.04.2016 Shift : 3

Ans : (a) 3, 4, 5, 5, 3, 6, 7, 3, 5, 5, 6

Arrange the data in ascending order

$= 3, 3, 3, 4, 5, 5, 5, 5, 6, 6, 7$

mode = 5 (most frequent)

∴ where n = 11 (odd)

Median = $\left(\frac{n+1}{2}\right)^{\text{th}} = \left(\frac{11+1}{2}\right)^{\text{th}} = 6^{\text{th}} \text{ term} = 5$

Hence, option (a) is correct.

- 157. What is the value of median, mode and mean of the given following numbers?**

9, 8, 3, 5, 1, 9, 8, 2, 9

- (a) 9, 9, 6 (b) 9, 6, 9
 (c) 8, 9, 6 (d) 8, 5, 6

RRB NTPC 26.04.2016 Shift : 1

Ans : (c) On arranging the number in ascending order-
1, 2, 3, 5, 8, 8, 9, 9, 9
n = 9 (odd)

$$\text{Median} = \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term} = \left(\frac{9+1}{2}\right)^{\text{th}} \text{ term} \\ = 5^{\text{th}} \text{ term} = \boxed{8}$$

$$\text{Mean} = \frac{\text{sum of all numbers}}{\text{Total numbers}} \\ = \frac{9+8+3+5+1+9+8+2+9}{9} = \frac{54}{9} = \boxed{6}$$

Mode = $\boxed{9}$ (Most frequent)

Hence median, mode and mean is 8, 9 and 6 respectively.

158. Calculate the value of $\frac{\text{Range}}{\text{Median}}$ for the set of

data given below:

134, 98, 194, 122, 108, 156

- (a) $\frac{48}{67}$ (b) $\frac{3}{4}$
(c) $\frac{8}{9}$ (d) $\frac{48}{61}$

RRB NTPC (Stage-II) 16/06/2022 (Shift-III)

Ans. (b) : Ascending order of the given sets 98, 108, 122, 134, 156, 194 n = 6 (even)

$$\text{Range} = \text{Maximum value} - \text{minimum Value} \\ = 194 - 98 \\ = 96$$

If the number of term is even

$$\text{Median} = \frac{\frac{n}{2}^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2} \\ = \frac{3^{\text{th}} \text{ term} + 4^{\text{th}} \text{ term}}{2} \\ = \frac{122 + 134}{2} = 128$$

$$\frac{\text{Range}}{\text{Median}} = \frac{96}{128} = \frac{3}{4}$$

159. Find the median of the data 40, 50, 30, 20, 80, 70, 90, 50. Next, if 30 is replaced by 120, find the new median. The mean of the two medians found is.....

- (a) 60 (b) 110
(c) 55 (d) 50

RRB NTPC 25.01.2021 (Shift-I) Stage Ist

Ans. (c) : On arranging the data ascending order-
= 20, 30, 40, 50, 50, 70, 80, 90 $\Rightarrow n = 8$ (even)

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2} \\ = \frac{\left(\frac{8}{2}\right)^{\text{th}} \text{ term} + \left(\frac{8}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$\frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2} = \frac{50 + 50}{2} = 50$$

If the number 30 is replaced by 120 then-
20, 40, 50, 50, 70, 80, 90, 120

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ term} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{\left(\frac{8}{2}\right)^{\text{th}} \text{ term} + \left(\frac{8}{2} + 1\right)^{\text{th}} \text{ term}}{2}$$

$$= \frac{4^{\text{th}} \text{ term} + 5^{\text{th}} \text{ term}}{2} = \frac{50 + 70}{2} = 60$$

$$\text{Median} = \frac{50 + 60}{2} = 55$$

160. In the data set given below, what is the difference between the Median and the Mode?

{2.1, 5, 6, 7, 8, 9.3, 11, 15, 17, 19.21, 27, 31, 31, 33, 16.5, 14, 10}

- (a) 19 (b) 10
(c) 17 (d) 15

RRB NTPC (Stage-II) -12/06/2022 (Shift-I)

Ans. (c) : On arranging the numbers in ascending order,
2.1, 5, 6, 7, 8, 9.3, 10, 11, 14, 15, 16.5, 17, 19.21, 27, 31, 31, 33

Mode = 31 (2 times)

and, total number of terms (n) = 17 (odd)

$$\therefore \text{Median} = \left(\frac{n+1}{2}\right)^{\text{th}} \text{ term}$$

$$= \left(\frac{17+1}{2}\right)^{\text{th}} \text{ term}$$

$$= 9^{\text{th}} \text{ term} = 14$$

$$\therefore \text{Difference between Median and Mode} \\ = 31 - 14 = 17$$

Type - 7 Miscellaneous

161. In a frequency distribution, the mid value of a class is 12 and its width is 6. The lower limit of the class is

- (a) 12 (b) 9
(c) 18 (d) 6

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (b) : Upper limit of distribution = M,
Lower limit of distribution = L

$$\text{According to question, } \frac{M+L}{2} = 12 \\ = \frac{\text{Upper limit} + \text{lower limit}}{2}$$

Mid value of the distribution = Upper limit + lower

$$M+L = 24 \dots\dots(i)$$

$$M-L = 6 \dots\dots(ii)$$

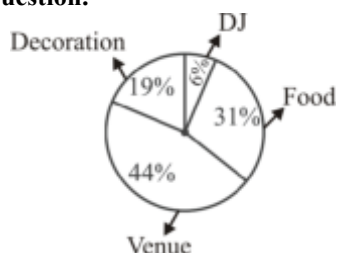
For solving eqⁿ (i) and eqⁿ (ii), We get
L = 9

Data Interpretation

Type - 1 Problems Based on Pie-Chart

1. The following pie chart shows the expenditure distribution of a party. The blue part represents decoration expense, green part represents DJ expense, red part represents the food expenses and yellow part represents venue expenses.

Study the pie chart and answer the following question.



How much was spent on decoration and DJ together if the total expenditure was ₹32,700?

- (a) ₹7359 (b) ₹8175
(c) ₹8347 (d) ₹7725

RRB NTPC (Stage-2) 16/06/2022 (Shift-I)

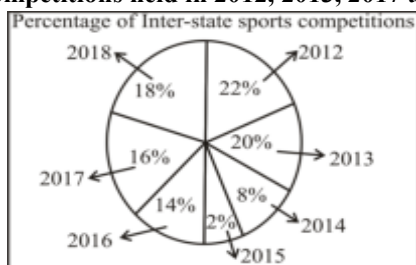
Ans. (b) : Total expenditure on decoration and DJ
= 19 + 6 = 25%

According to the question,

$$\therefore 100\% = 32700$$

$$25\% = \frac{32700}{100} \times 25 \\ = ₹ 8175$$

2. The pie-chart shows the percentage of inter-State sports competitions in different years from 2012 to 2018. Considering the total number of inter-State sports competitions to be 200, find the total number of inter-State sports competitions held in 2012, 2013, 2017 and 2018.



- (a) 154 (b) 168
(c) 152 (d) 148

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : Number of inter-Stage sports competition in

$$2012 = 200 \times \frac{22}{100} = 44$$

Number of inter-Stage sports competition in 2013 =

$$200 \times \frac{20}{100} = 40$$

Number of inter-Stage sports competition in 2017 =

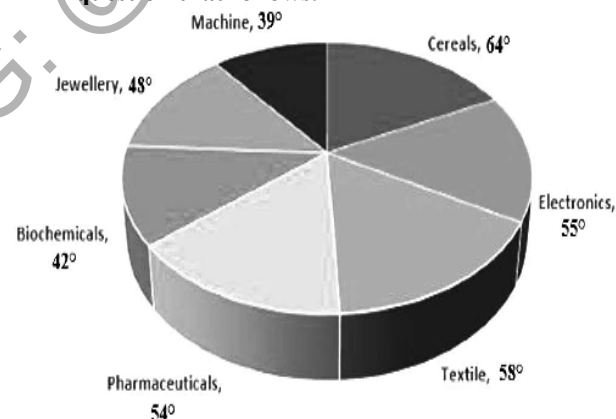
$$200 \times \frac{16}{100} = 32$$

Number of inter-Stage sports competition in 2018 =

$$200 \times \frac{18}{100} = 36$$

\therefore Total number of inter-Stage sports held in 2012, 2013, 2017 & 2018 = 44 + 40 + 32 + 36 = 152

3. Study the following circle graph carefully that shows the spending of a country on various products imported from neighbouring country during a particular year and answer the question that follows.



If the amount spent on importing textiles and cereals during the year was ₹2 crore, then what was the total amount (approximately) spent on importing all the various products from the country in that year?

- (a) ₹5.9 crore (b) ₹3 crore
(c) ₹6.5 crore (d) ₹4.25 crore

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question, $(64^\circ + 58^\circ) = ₹ 2$ crore

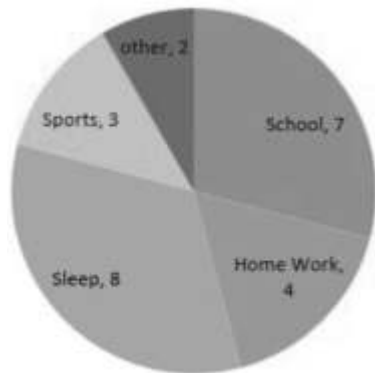
$$122^\circ = ₹ 2 \text{ crore}$$

$$\therefore 360^\circ = \frac{2}{122^\circ} \times 360^\circ \\ = ₹ 5.90 \text{ crore}$$

Hence, the total amount spent on importing all the various products from the country in that year was ₹5.9 crore.

Direction:- (3-6) Study the pie chart and answer the question that follows.

The pie chart shows the numbers of hours used for different activities of the day. Total hours in a day are 24.



4. Which part of the day is spent in school and other activities ?

- (a) $\frac{3}{8}$ (b) $\frac{2}{9}$
(c) $\frac{7}{24}$ (d) $\frac{5}{8}$

RRB NTPC 14.03.2021 (Shift-I) Stage I

Ans. (a) :

Time spent in school and other activities = 2 + 7
= 9 hr.

Total time = 24 hr.

$$\therefore \text{Required part of the day} = \frac{9}{24} = \frac{3}{8}$$

5. What is the measure of the central angle with respect to sleep ?

- (a) 120° (b) 145°
(c) 135° (d) 160°

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (a) : $\because 24 \text{ hr} = 360^\circ$

$$\therefore 1 \text{ hr} = \frac{360^\circ}{24}$$

$\therefore 8 \text{ hr}$ spent in sleeping

$$\therefore \text{Required central angle} = \frac{360^\circ}{24} \times 8 = 120^\circ$$

6. What is the percentage of hours spent on sports in a day?

- (a) 13.5% (b) 15%
(c) 12.5% (d) 12%

RRB NTPC 14.03.2021 (Shift-I) Stage Ist

Ans. (c) : Time spent on sports = 3 hr

Total time = 24 hr

$$\therefore \text{Required percentage} = \frac{3}{24} \times 100 = 12.5\%$$

7. If a student devotes 4 h to other activities instead of 2 h and reduces 1 h each from school and sports activities, then what will be the approximate percentage decrease in school hours ?

- (a) 18% (b) 13%
(c) 14% (d) 15%

RRB NTPC 14.03.2021 (Shift-I) Stage I

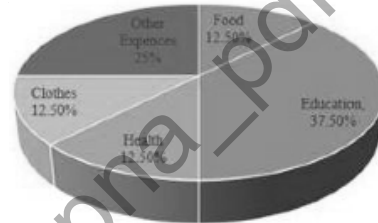
Ans. (c) : The time spent on school = 7 hr

Now time spent on school = 6 hr(After reducing)

$$\begin{aligned} \therefore \text{Required percentage} &= \frac{(7-6)}{7} \\ &= \frac{1}{7} \times 100 \\ &= 14.28 \\ &= 14\% \end{aligned}$$

Direction - (Que. 8 - 11)

8. The following pie diagram shows the total expenditure (in percentage) incurred by 'X' in one month. Answer the given question based on the pie diagram.



If X does not incur 'Other Expenses' and all other expenses remain the same, what would be the approximate percentage share of education expenses in X's total expenditure?

- (a) 50% (b) 33%
(c) 28% (d) 37%

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (a) : Total expenditure = 100%

Expenditure on other expenses = 25%

If X does not spent on other expenses

Total expenditure = 75%

$$\therefore \text{Expenditure on education} = \frac{37.50}{75} \times 100\% = 50\%$$

9. If X decides to save money and reduce expenditure uniformly by 20% on all heads, what would be the CHANGE in the percentage share of Education in the total expenditure incurred by X?

- (a) 7.5% (b) 0%
(c) 20% (d) 9.38%

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (a) : 20% is deducted on each item.

$$\begin{aligned} \text{Change of shares to be spent on education} &= 37.50 \times \frac{20}{100} \\ &= 7.5\% \end{aligned}$$

10. The expenditure incurred on education is as much as that incurred on:

- (a) Clothes and Health
(b) Food and Clothes
(c) Health and Food
(d) Food and other expenses

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (d) : Expenditure on education = 37.5%

Expenditure on food and other expenses

$$= 25\% + 12.5\% = 37.5\%$$

\therefore Option (d) is correct.

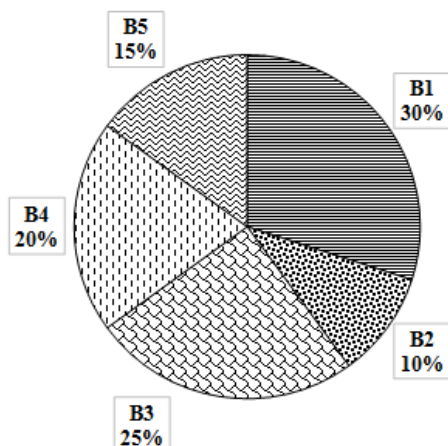
11. The highest percentage of total expenditure is incurred on:

- (a) Health and Clothes
(b) Food and Other Expenses
(c) Food and Health
(d) Clothes and Food

RRB NTPC 18.01.2021 (Shift-II) Stage Ist

Ans. (b) : Food and other expenses is the maximum percentage of total expenditure in the given option.

12. Observe the pie chart below and answer the question. The pie-chart shows the percentage distribution of the sales of school bags from five branches B1, B2, B3, B4 and B5 of a company.



What is the central angle of the sector corresponding to the sales of school bags from branch B3 of the company ?

- (a) 80° (b) 45°
(c) 90° (d) 120°

RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (c) : The angle of the sector corresponding to the sales of school bags from branch B-3 of the company.

$$= \frac{25}{100} \times 360^\circ = 90^\circ$$

13. If the angle of a sector in a pie diagram is 135° , then it is equivalent to _____ of the pie diagram.

- (a) $\frac{3}{4}$ (b) $\frac{3}{8}$
(c) $\frac{1}{8}$ (d) $\frac{1}{4}$

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

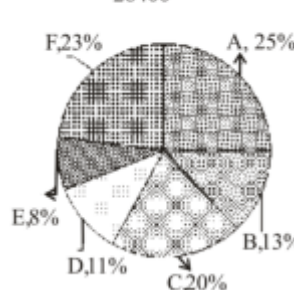
Ans. (b) :

\therefore The measure of the angle about the center of the circle is $360^\circ \Rightarrow 1$ part

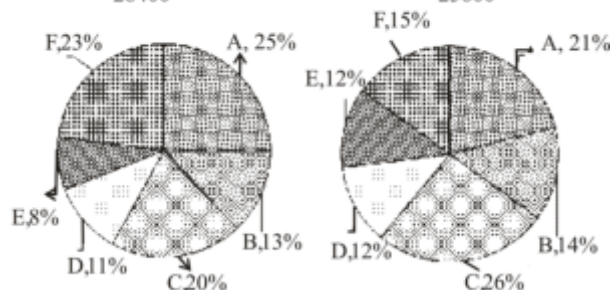
$$\therefore \text{Angle of the segment} = 135^\circ \Rightarrow \frac{1}{360^\circ} \times 135^\circ = \frac{3}{8} \text{ part}$$

Direction. (Qus no. 14-15): Study the following pie chart and then answer the given question

UG students in 6 colleges
= 28400



PG students in 6 colleges
= 25600



14. What is the difference between the number of under-graduate(UG) students and the number of post-graduate (PG) students in college F?

- (a) 2048 (b) 2272
(c) 2692 (d) 1481

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

Ans. (c) : Required difference in college F

$$28400 \times 23\% - 25600 \times 15\% \\ = 284 \times 23 - 256 \times 15 = 6532 - 3840 = 2692$$

15. What is the ratio of the number of postgraduate (PG) students to that of undergraduate (UG) student in college C ?

- (a) 416:355 (b) 71:64
(c) 12:10 (d) 13:10

RRB NTPC 05.04.2021 (Shift-II) Stage Ist

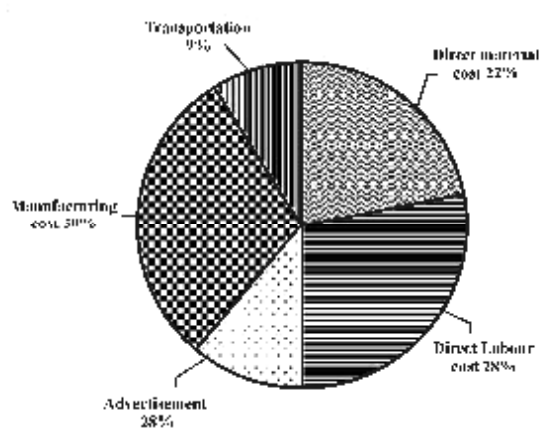
Ans. (a) : Number of Post-Graduate (PG) students in college C = $25600 \times \frac{26}{100}$

Number of Under-Graduate (UG) students in college C

$$28400 \times \frac{20}{100}$$

$$\text{Required ratio} = 256 \times 26 : 284 \times 20 = 416 : 355$$

16. The following pie chart shows the percentage distribution of the expenditure incurred in manufacturing furniture. Study the pie chart and answer the question that follows.



What is the central angle of the sector corresponding to the expenditure incurred on Direct labour cost

- (a) 110.9° (b) 100.8°
(c) 150° (d) 90°

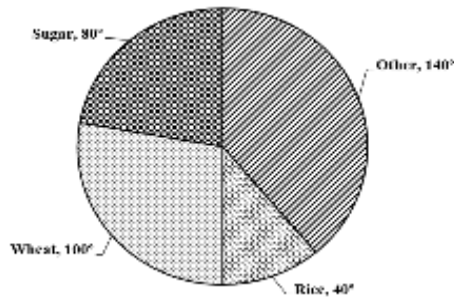
RRB NTPC 04.03.2021 (Shift-II) Stage Ist

Ans. (b) : We know that,
 $100\% = 360^\circ$
 $1\% = \frac{360^\circ}{100}$

\therefore Direct labour cost is 28%

Therefore, $\frac{360^\circ}{100} \times 28 = 100.8^\circ$

17. Study the given pie chart that shows the annual Agricultural yield of a certain place and answer the question that follows.



If the total production is 8100 tonnes, then the yield of rice (in tonnes) will be:

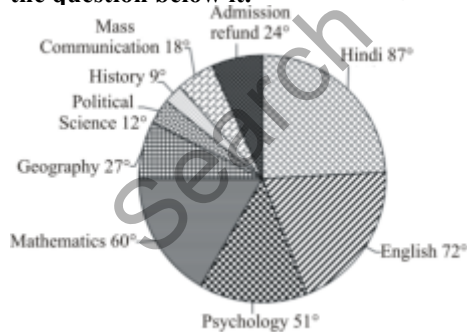
- (a) 2025 (b) 900
 (c) 4860 (d) 3240

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (b) : Total production = 8100 Tonnes

$$\text{Yield of rice} = 8100 \times \frac{40^\circ}{360^\circ} = 900 \text{ Tonnes}$$

Direction: (18-19) There are 1800 students in a college. The given pie-chart represents (in degrees) the number of students studying various subjects. Study the chart and answer the question below it.



18. How many students are studying mathematics in the college?

- (a) 300 (b) 240
 (c) 280 (d) 260

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (a) :

Number of students studying mathematics in the college
 $= \frac{\text{Number of total students} \times \text{Angle of sector corresponding to Mathematics}}{360^\circ}$

$$= \frac{1800}{360} \times 60^\circ = 300$$

19. If the course called political science is discontinued and the students studying in it are equally distributed among history and mass communications courses, then calculate the increase in the number of students in mass communication course?

- (a) 30 (b) 90
 (c) 120 (d) 75

RRB NTPC 13.01.2021 (Shift-I) Stage Ist

Ans. (a) : Angular expansion of students studying Political Science = 12°

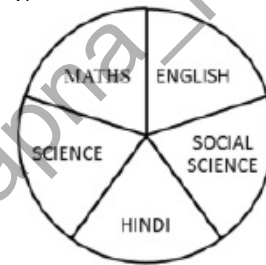
Equally distributed share in History and Mass

$$\text{Communication} = \frac{12}{2} = 6^\circ$$

The increase in Mass Communication of Political

$$\text{Science} = \frac{1800}{360} \times 6 = 30$$

20. Observe the figure carefully and answer the question given below



If the total number of students is 120, and the number of students is distributed equally across all the subjects, how many students study languages English and Hindi.

- (a) 36 (b) 24
 (c) 48 (d) 12

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

Ans. (c) : Let the total number of students in each subject = x

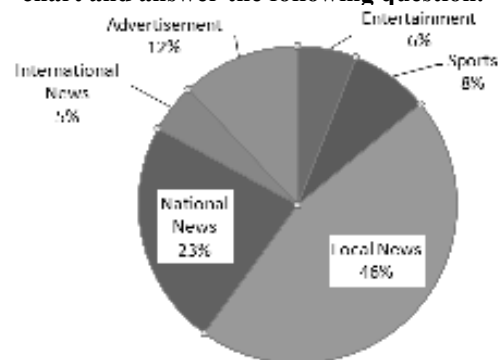
Total number of students = 5x

$$\Rightarrow 5x = 120$$

$$\Rightarrow x = 24$$

Number of students studying languages (Hindi + English) = 24 + 24 = 48

Direction: (21-24) The given pie chart shows the percentage-wise distribution of new items published under various sections in a newspaper in the last month. Study the pie chart and answer the following question.



21. If a total of 4800 items were published in the month, then how many of them were advertisements?
 (a) 612 (b) 320
 (c) 428 (d) 576

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (d) : Total items published in that month = 4800

$$\text{Advertisement Items} = 4800 \times \frac{12}{100} = 576$$

22. Find the ratio of Advertisements to Sports items published.
 (a) 2 : 1 (b) 1 : 2
 (c) 3 : 2 (d) 2 : 3

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (c) : Required ratio = $\frac{\text{Advertisement Items}}{\text{Sport Items}}$

$$= \frac{4800 \times 12\%}{4800 \times 8\%} = 3 : 2$$

23. If in the next month the number of advertisements double while the number of all other news items remain the same what would be the approximate share of local news as a percentage of the total number of published news items?
 (a) 41% (b) 52%
 (c) 37% (d) 22%

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (a) : Number of advertisement = 12%
 2 times of the advertisement = $12\% \times 2 = 24\%$
 Share of local news items as a percentage of the total number of published news items

$$\frac{46}{46 + 23 + 5 + 24 + 6 + 8} \times 100$$

$$= \frac{46}{112} \times 100 = 41\% \text{ (Approximate)}$$

24. If the total number of news items published in 4 week period were 48000 and if 30 news items can be published on any one page, then how many pages will be there related to Advertisement and Sports news in 2 weeks?
 (a) 160 (b) 120
 (c) 320 (d) 240

RRB NTPC 27.03.2021 (Shift-II) Stage Ist

Ans. (a) : The total number of news items published in 4 weeks = 48000

Advertisement items in 2 weeks

$$= 48000 \times \frac{12}{100} \times \frac{1}{2} = 2880$$

$$\text{Number of page of advertisement} = \frac{2880}{30} = 96$$

(1 page = 30 news items)

The number of sports items in two weeks

$$= 48000 \times \frac{8}{100} \times \frac{1}{2} = 1920$$

Number of pages of sports items in 2 weeks

$$= \frac{1920}{30} = 64$$

Total number of pages of advertisements and sports items in 2 weeks-

$$= 96 + 64 = 160$$

25.



The above pie-chart shows the amount by each of the departments on their annual functions. Find the amount spent by Admin and HR, if L and D expense amounts to ₹6,400.

- (a) ₹ 30,400 (b) ₹ 37,475
 (c) ₹ 33,155 (d) ₹ 31,740

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

Ans. (a) : Let, total amount = ₹ x

The amount spent by L & D = ₹6400 ... (Given)

$$x \times \frac{40^\circ}{360^\circ} = 6400$$

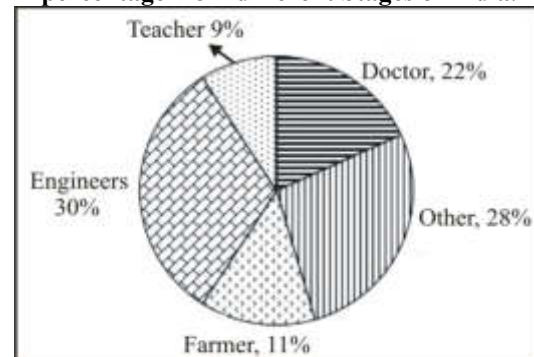
$$x = 6400 \times 9$$

$$x = 57600$$

Amount spent by a Admin and HR

$$= 57600 \times \frac{(100^\circ + 90^\circ)}{360^\circ} = 57600 \times \frac{190^\circ}{360^\circ} = ₹30,400$$

26. The following pie chart shows the number of people of various occupations in terms of percentage from different Stages of India.



For the farmer sector what is the approximate measure of the central angle?

- (a) 35° (b) 25°
 (c) 30° (d) 40°

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

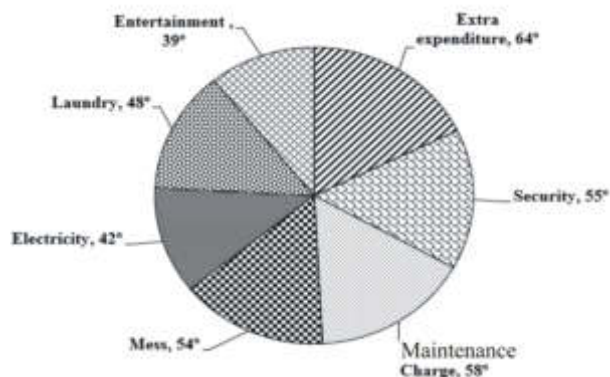
Ans. (d) : As per question,

$$\text{Required central angle} = 360 \times \frac{11}{100}$$

$$= 39.6^\circ$$

$$= 40^\circ \text{ (Approx)}$$

27. The given pie chart shows the expenditure (in lakh rupees) made by the private hostel on various items during a year. Answer the given question on the basis of the pie chart.



If the total expenditure incurred by the hostel during this year was 50 lakhs then what was the total expenditure (approx) on the maintenance charge and security?

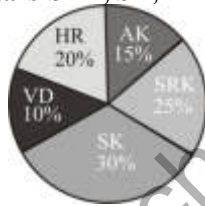
- (a) 41 lakhs (b) 16 lakhs
(c) 8 lakhs (d) 21 lakhs

RRB NTPC 23.07.2021 (Shift-II) Stage 1st

Ans. (b) : According to the question,
 $360^\circ = 50 \text{ lakhs}$
 Total central angle of security and maintenance charge
 $= 55^\circ + 58^\circ$
 $= 113^\circ$
 $\therefore \text{Total required expenditure} = \frac{5000000 \times 113}{360}$
 $= ₹1,569,444.44$
 $= ₹16 \text{ lakhs (Approx)}$

Note : (28-30) pie chart shows favorite stars of a family people.

(Bollywood stars SRK, SK, AK, HR and VD)



Study the pie chart carefully and answer the questions based on it.

28. The ratio of those who like SK to those who like SRK is ?

- (a) 6/5 (b) 5/6
(c) 1/2 (d) 2/1

RRB NTPC 11.04.2016 Shift : 2

Ans. (a) : SRK = 25 %
 SK = 30 %
 SK : SRK = 30 : 25
 $= 6 : 5$
 $= 6/5$

29. Which is the sector angle of HR.

- (a) 36° (b) 72°
(c) 54° (d) 108°

RRB NTPC 11.04.2016 Shift : 2

Ans. (b) : Percentage of HR = 20%
 Total angles = 360°
 Angle of sector corresponding to HR = $360 \times \frac{20}{100} = 72^\circ$

30. If there are 40 people in the family, the difference between those who like AK and those who like VD

- (a) 2 (b) 3
(c) 4 (d) 6

RRB NTPC 11.04.2016 Shift : 2

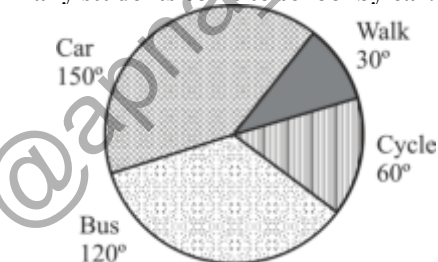
Ans. (a) : Number of family members = 40

$$\text{Number of people who like AK} = 40 \times \frac{15}{100} = 6$$

$$\text{Number of people who like VD} = 40 \times \frac{10}{100} = 4$$

$$\text{Required difference} = 6 - 4 = 2$$

31. In a school, 1200 students were asked about their arrival vehicles and information received is indicated by the following pie chart, then based on the information given, find out how many students come to school by car.

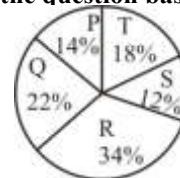


- (a) 1000 (b) 900
(c) 500 (d) 750

RRB NTPC 28.03.2016 Shift : 2

Ans. (c) : Total students = 1200
 Angle out of 360° of students arriving by car = 150°
 Number of students arriving by car = $1200 \times \frac{150^\circ}{360^\circ} = 500$

Note (32-34): The following pie chart shows the 5 Stages P, Q, R, S and T forest area. Consider the chart and answer the question based on it.



32. What would be the area of the Stage Q if the total area is 61700 sq. km.

- (a) 11686 sq. km (b) 12,340 sq. km
(c) 13,574 sq. km (d) 19,744 sq. km

RRB NTPC 04.04.2016 Shift : 2

Ans. (c) : The area of Stage Q

$$= 61700 \times \frac{22}{100} = 617 \times 22 = 13574 \text{ sq. km}$$

33. Sector angle of Stage P is.....

- (a) 50.4° (b) 64.8°
(c) 43.2° (d) 79.2°

RRB NTPC 04.04.2016 Shift : 2

Ans. (a) : Sum of sector angles of all Stages = 360°

$$\text{Sector angles of Stage P} = \frac{360 \times 14}{100} \quad \left[\begin{array}{l} \because 100\% = 360^\circ \\ 14\% = \frac{360 \times 14}{100} \end{array} \right]$$

$$= 50.4^\circ$$

34. The ratio of forest area of Stage R to the combined forest area of Stages T and S is.

- (a) 17/16 (b) 17/15
(c) 11/15 (d) 11/16

RRB NTPC 04.04.2016 Shift : 2

Ans. (b) :

Intended ratio = (Forest area of Stage R) : (Forest area of Stages T and S)

$$= 34\% : (18+12)\%$$

$$= 34 : 30$$

$$= 17 : 15$$

$$= \frac{17}{15}$$

Type - 2 Problems Based on Table

35. The loan disbursement at ABC bank in the last 5 years is as shown in the table.

Sr. No.	Years	Rupees (in Crore)
1	2016	75
2	2017	85
3	2018	125
4	2019	145
5	2020	190

Which year has the maximum percentage growth in the loan disbursement over the previous years?

- (a) 2020 (b) 2017
(c) 2019 (d) 2018

RRB NTPC (Stage-2) 14/06/2022 (Shift-I)

Ans. (d) :

Percentage growth in year 2020

$$= \frac{190-145}{145} \times 100 = \frac{4500}{145} = 31.03\%$$

Percentage growth in year 2017 =

$$= \frac{85-75}{75} \times 100 = \frac{10}{3} \times 4 = 13.33\%$$

Percentage growth in year 2019 =

$$= \frac{145-125}{125} \times 100 = \frac{20}{5} \times 4 = 16\%$$

Percentage growth in year 2018

$$= \frac{125-85}{85} \times 100$$

$$= \frac{40}{85} \times 100$$

$$= 47.05\%$$

Hence, in year 2018 has the maximum percentage growth in the loan disbursement over the previous years.

36. The following table presents the expenditure of a company on various heads over five years.

Expenditures of a company (in Lakhs)					
Year	Expenditure Heads				Offers and Promotions
	Salary	Transport	Taxes	Advertising	
2017	361	93	83	142	52
2018	273	57	65	133	86
2019	645	110	152	108	95
2020	712	108	165	112	48
2021	652	111	132	101	75

(Reference- Expenditures of a company (in Lakhs), Expenditure Heads, Year, Salary, Transport, Taxes, Advertising, Offers and Promotions)

The company's total expenditure in 2017 was approximately what percentage of its total expenditure in 2021?

- (a) 71% (b) 61%
(c) 68% (d) 55%

RRB NTPC (Stage-2) 15/06/2022 (Shift-I)

Ans. (c) : According to the question,

Total expenditure of 2017 = $361 + 93 + 83 + 142 + 52$

$$= 731 \text{ Lakhs}$$

Total expenditure of 2021 = $652 + 111 + 132 + 101 + 75$

$$= 1071 \text{ Lakhs}$$

Percentage = $\frac{731}{1071} \times 100$

$$= 68.25$$

$$\approx 68\%$$

37. The following table shows the population of six different cities, A, B, C, D, E and F, the ratio of males to females among them and the ratio of adults to children in the total population. Study the table and answer the question.

City	Population	Male:Female	Adult:Children
A	410400	13 : 11	5 : 3
B	369900	5 : 4	7 : 2
C	442800	5 : 7	7 : 5
D	465500	17 : 18	4 : 3
E	499500	5 : 4	5 : 4
F	424500	5 : 7	17 : 13

What is the difference between the total number of adults and the total number children in city A?

- (a) 1,02,600 (b) 1,04,600
(c) 1,02,000 (d) 1,12,600

RRB NTPC (Stage-2) 13/06/2022 (Shift-II)

Ans. (a) : Given,

Ratio of adult to children in city A = 5 : 3

Total population in city A = 410400

Total no. of adults in city A = $\frac{5}{8} \times 410400$

Total no. of children's in city A = $\frac{3}{8} \times 410400$

$$\begin{aligned}\therefore \text{Required difference} &= \frac{5}{8} \times 410400 - \frac{3}{8} \times 410400 \\ &= \frac{1}{8} \times 410400 [5 - 3] \\ &= \frac{2}{8} \times 410400 \\ &= \frac{410400}{4} \\ &= 1,02,600\end{aligned}$$

Hence option (a) is correct.

38. Study the following table and answer the question given below.

Name of the Company	Sale (in lakhs)		
	1999	2000	2001
ACG	32	43	35
TYD	61	52	29
POD	54	25	36
BKN	19	38	52

Which company has the highest total sale value over the three years. What is the difference between the value of the highest combined sales and the lowest combined sales registered by any company from 1999 to 2001.

- (a) BKN, ₹27,00,000 (b) TYD, ₹27,00,000
(c) TYD, ₹33,00,000 (d) BKN, ₹33,00,000

RRB NTPC (Stage-2) 16/06/2022 (Shift-II)

Ans. (c) : According to the question :-

Total sale value of company ACG
 $= 32 + 43 + 35 = 110$ Lakhs
 Total sale value of company TYD
 $= 61 + 52 + 29 = 142$ Lakhs
 (Highest sale)
 Total sale value of company POD
 $= 54 + 25 + 36 = 115$ Lakhs
 Total sale value of company BKN
 $= 19 + 38 + 52 = 109$ Lakhs
 Required Difference = Highest sale - Lowest sale
 $142 \text{ Lakh} - 109 \text{ lakh}$
 $= 33 \text{ Lakh or } (33,00,000)$

39. The following table gives the number of fresh registrations of scooters and motorcycles in a city in three years. In which year(s) did the number of fresh registrations of both scooters and motorcycles separately and together register fluctuation of more than 50%?

Year	2004-05	2005-06	2006-07
Vehicle			
Scooters	904	1316	2017
Motorcycles	1654	2019	722

- (a) 2006-2007
(b) 2005-2006
(c) Both 2005-06 and 2006-07
(d) Neither 2005-06 nor 2006-07

RRB NTPC 13.03.2021 (Shift-I) Stage Ist

Ans. (d) : Percentage increase in the number of scooters in the year 2005-06 = $\frac{(1316 - 904)}{904} \times 100 = 45.57\%$

Percentage increase in the number of scooters in the year 2006-07 = $\frac{(2017 - 1316)}{1316} \times 100 = 53.27\%$

Percentage increase in the number of motorcycles in the year 2005-06 = $\frac{(2019 - 1654)}{1654} \times 100 = 22.06\%$

Percentage decrease in the number of motorcycles in the year 2006-07 = $\frac{(2019 - 722)}{2019} \times 100 = 64.23\%$

Percentage increase in the number of scooters and motorcycles together in 2005-06

$$= \frac{(1316 + 2019) - (904 + 1654)}{(904 + 1654)} \times 100 = 30.37\%$$

Percentage decrease in the number of scooters and motorcycles together in 2006-07

$$= \frac{(1316 + 2019) - (2017 + 722)}{(1316 + 2019)} \times 100 = 17.87\%$$

Hence, neither 2005-06 nor 2006-07 has seen fluctuation of more than 50%

Direction (Q. N. 40-43) : Observe the table below and answer the following question:

Year	Population	Consumption of electricity (GW)
2015	20	25
2016	30	40
2017	40	60
2018	50	80
2019	60	100

1 GW = 100 Million Watt

Population in Million

40. In the year 2016, what was the consumption of electricity per person?

- (a) 133.33W (b) 333.33W
(c) 266.67W (d) 166.67W

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (a) : In 2016 years, consumption of electricity per person

$$\begin{aligned}&= \frac{40 \times 100}{30} \\ &= \frac{400}{3} \\ &= 133.33 \text{ W}\end{aligned}$$

41. By what percentage did the consumption of electricity increase from 2015 to 2019?

- (a) 100% (b) 75%
(c) 25% (d) 300%

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (d) : Percentage increase of electricity consumption from 2015 to 2019 = $\frac{(100 - 25)}{25} \times 100$

$$\begin{aligned}&= \frac{75}{25} \times 100 \\ &= 300\%\end{aligned}$$

42. In which year did electricity consumption grow by 50%?

- (a) 2016 (b) 2017
(c) 2018 (d) 2019

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (b) : From option (b)
Percentage increase in electricity consumption in 2017

$$= \frac{60 - 40}{40} \times 100$$

$$= \frac{20}{40} \times 100$$

$$= 50\%$$

Hence, electricity consumption grow by 50% in the year 2017.

43. Which of the following is true with regards to consumption of electricity per person based on the figures given in the table above?

- (a) Increased by more than 40% in 2019 as compared to 2015
(b) Neither increased nor decreased between 2015 and 2019
(c) Decreased between 2015 and 2019
(d) Increased between 2015 and 2019

RRB NTPC 28.01.2021 (Shift-I) Stage Ist

Ans. (d) : In terms of per capita electricity consumption based on the data given in the above table that is increase between 2015 and 2019.

44. This table shows the number of males and females in some groups. Which of the groups listed has the highest ratio of females to males?

Group Name	No. of Male	No. of Female
C	950	414
B	650	414
M	700	410
S	720	408
R	740	405

- (a) Group C (b) Group B
(c) Group S (d) Group R

RRB NTPC 21.01.2021 (Shift-II) Stage Ist

Ans. (b) : From the given options—
 (a) Ratio of female and male in Group C = $\frac{414}{950} = 0.43$
 (b) Ratio of female and male in Group B = $\frac{414}{650} = 0.64$
 (c) Ratio of female and male in Group S = $\frac{408}{720} = 0.57$
 (d) Ratio of female and male in Group R = $\frac{405}{740} = 0.55$
 Hence, It is clear that the ratio of Group B is maximum.

Direction: (Q.45–48) : The given table shows the details of the expenditure incurred (in crores) by a tea garden during the years 2013 to 2017. Study the table carefully and answer the following question.

Year	Items of Expenditure (₹ in Crores)				
	Salary	Fuel etc	Bonus	Interest on loans	Taxes
2013	60.5	20.0	0.8	4.88	18.6
2014	68.4	23.4	0.4	7.00	22.6
2015	62.8	19.4	0.86	8.85	16.8
2016	67.2	28.8	0.89	6.28	17.5
2017	84.0	30.2	0.96	10.11	21.6

45. In which year was the total expenditure on 'Taxes' and 'Interest on loans' less than expenditure on 'Fuel etc.'

- (a) 2014 (b) 2016
(c) 2013 (d) 2015

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (b) : From option (b),
In 2016, total expenditure on Interest on loans and Taxes = 6.28 + 17.5 = 23.78
Total expenditure of Fuel in 2016 = 28.8
∴ 28.8 > 23.78
So, in 2016, expenditure on Interest on loans and Taxes are less than that on Fuel.

46. The average yearly expenditure on 'Salary' from 2013 to 2017 was approximately.

- (a) ₹69.58 Crores (b) ₹68.00 Crores
(c) ₹68.58 Crores (d) ₹67.58 Crores

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (c) : As per table,
Expenditure on Salary from 2013-2017

$$= 60.5 + 68.4 + 62.8 + 67.2 + 84$$

$$= 342.9 \text{ crores}$$

In total time (years) = 5 years
Average annual expenditure = $\frac{342.9}{5} = ₹68.58 \text{ Crores}$

47. The range of expenditure incurred over the five year period is most similar for which of the following items of expenditure.

- (a) Salary and Fuel etc
(b) Fuel etc and Interest on loans
(c) Salary and Taxes
(d) Interest on loans and Taxes

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (d) : The expenditure incurred over the five year period is most similar for Interest on loans and Taxes.

48. In which year was the percentage increase of the expenditure on Salary, as compared to the previous year, more than 20%.

- (a) 2015 (b) 2016
(c) 2017 (d) 2014

RRB NTPC 03.02.2021 (Shift-I) Stage Ist

Ans. (c) : From given table, by option (c)
Expenditure on Salary in 2016 = 67.2 Crores
Expenditure on Salary in 2017 = 84.0 Crores
Increment percent of expenditure on Salary in 2017, as reference to 2016.

$$\frac{84 - 67.2}{67.2} \times 100 = 25\%$$

Hence, in 2017 expenditure on Salary is increased by 25% which is more than 20% in comparison to previous year.

49. The given table shows the marks obtained by a student in different subjects in the first and second sessions. The total score of each test was one hundred.

Subject	Eng.	Hindi	Maths	Science	Social Science
Obtained Marks of first Session	65	70	88	82	71
Obtained Marks of Second Session	67	68	94	85	75

In which subject does the student improve his performance the least.

- (a) English (b) Hindi
(c) Science (d) Social Science

RRB NTPC 23.07.2021 (Shift-II) Stage Ist

Ans. (a) : Marks improved by the student in various subjects-

In English $\rightarrow 67 - 65 = 2$ marks

In Math $\rightarrow 94 - 88 = 6$ marks

In Science $\rightarrow 85 - 82 = 3$ marks

In Social science $\rightarrow 75 - 71 = 4$ marks

Hence, it is clear that the student improves his performance the least in English subject.

- 50. The following table shows the number of students that appeared and were selected in the entrance exam of the department of engineering of a certain university from 5 different cities A, B, C, D and E.**

City	Appeared	Selected
A	2800	1900
B	3000	1800
C	2800	1950
D	2400	2000
E	2600	1700

In which of the following cities have the minimum percentage of selection in the entrance exam of the university.

- (a) A (b) B
(c) E (d) C

RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (b) : Percentage of students from different cities who got selected in the entrance examination of the university.

$$\begin{aligned}\text{From the city A} &= \frac{1900}{2800} \times 100 \\ &= 67.86\%\end{aligned}$$

$$\begin{aligned}\text{From the city B} &= \frac{1800}{3000} \times 100 \\ &= 60\%\end{aligned}$$

$$\begin{aligned}\text{From the city C} &= \frac{1950}{2800} \times 100 \\ &= 69.64\%\end{aligned}$$

$$\begin{aligned}\text{From the city D} &= \frac{2000}{2400} \times 100 \\ &= 83.33\%\end{aligned}$$

$$\begin{aligned}&= 83.33\% \\ \text{From the city E} &= \frac{1700}{2600} \times 100 \\ &= 65.38\%\end{aligned}$$

So, it is clear that the percentage of students who got selected in the university entrance examination from city B is minimum.

- 51. Study the following table carefully to answer the question.**

Expenditure (in million \$) of a company A over the years.

Items of expenditure	Years			
	2012	2013	2014	2015
Salary	145	115	200	255
Transport	48	60	71	82
Interest on loans	25	18	14	13
Taxes	4	3.5	2	6.5

What is the ratio between the expenditure on taxes in the year 2014 to the total expenditure on transport for all the years respectively?

- (a) 1 : 135.5 (b) 1 : 133.5
(c) 1 : 131.5 (d) 1 : 130.5

RRB NTPC 27.02.2021 (Shift-I) Stage Ist

Ans. (d) : Expenditure on taxes in 2014 = 2
Total expenditure on transport for all the years

$$\begin{aligned}&= 48 + 60 + 71 + 82 \\ &= 261\end{aligned}$$

$$\begin{aligned}\text{Required ratio} &= \frac{2}{261} \\ &= \frac{1}{130.5}\end{aligned}$$

- 52. According to the given table, how many schools won less than 15 gold medals in any of the two consecutive years? X = Schools, Y = Year.**

X \ Y	2001	2002	2003	2004
	→			
School A	20	13	16	11
School B	15	18	14	25
School C	14	21	16	9
School D	19	8	14	21
School E	5	12	16	17

Number of Gold Medals won by different schools in different years during Interschool competition.

- (a) 3 (b) 1
(c) 2 (d) 4

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : According to given table,
School-D won less than 15 gold medals in 2002 and 2003.
School-E won less than 15 gold medals in 2001 and 2002.
Hence, two school are their which won less than 15 gold medals in any of two consecutive years.

53. According to the given table, which of the following has the highest growth rate of production from 2001 to 2005?

Years	Gold	Silver	Copper	Iron
2001	24	87	12	27
2002	56	89	20	29
2003	65	95	35	16
2004	75	101	43	37
2005	85	103	54	69

Production of four elements (Thousand tonnes)

- (a) Iron (b) Silver
(c) Copper (d) Gold

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : From option-

Percentage growth of Iron

$$= \frac{69-27}{27} \times 100 = 155.55\%$$

Percentage growth of Silver

$$= \frac{103-87}{87} \times 100 = 18.390\%$$

Percentage growth of Copper

$$= \frac{54-12}{12} \times 100 = 350\%$$

Percentage growth of Gold

$$= \frac{85-24}{24} \times 100 = 254.16\%$$

Hence, the highest growth rate of production from 2001 to 2005 is Copper.

54. Read the given information and answer the question that follows.

In a certain month, a woman spent her monthly salary on different item as given in the following table.

Item	Clothing	House rent	Food	Education	Miscellaneous
Amount spent (in ₹)	800	3600	1600	600	1200

What is the ratio of the expenses on food to that on house rent?

- (a) 9 : 4 (b) 4 : 9
(c) 2 : 3 (d) 3 : 2

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Ans. (b) : In a certain month, woman expenses on food = ₹ 1600

And expense on house rent = ₹ 3600

The ratio of expenses on food and house rent

$$= \frac{1600}{3600} = \frac{400}{900} = \frac{4}{9}$$

Required ratio = 4 : 9

55. Study the given table and answer the question that follows-

Rate of Employment (in percentage) at Various Levels and Years

Year	Primary Level	Secondary Level	Higher Level	Total
1995	15	12	15	42
2000	20	18	20	58
2005	25	20	10	55
2010	30	25	15	70

Which of the following Stgements about the rate of employment figures provided in the table is true?

- (a) Rate of employment at secondary level increased by 50% between 1995 and 2000
(b) Rate of employment at secondary level increased by 10% between 2000 and 2005
(c) Rate of employment at secondary level increased by 20% between 2005 and 2010
(d) Rate of employment at higher level increased by 25% between 1995 and 2000

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Ans. (a) : Rate of employment at secondary level

$$\text{increased between 1995 and 2000} = \left(\frac{18-12}{12} \right) \times 100 = 50\%$$

Rate of employment at secondary level increased

$$\text{between 2000 and 2005} = \left(\frac{20-18}{18} \right) \times 100 = 11\frac{1}{9}\%$$

Rate of employment at secondary level increased

$$\text{between 2005 and 2010} = \left(\frac{25-20}{20} \right) \times 100 = 25\%$$

Rate of employment at higher level increased between

$$1995 \text{ and } 2000 = \left(\frac{20-15}{15} \right) \times 100 = 33\frac{1}{3}\%$$

Hence, option (a) is correct.

56. Study the given information in the table and answer the question that follows.

The following table shows the details of the number of people who booked a ticket and travelled from Punjab, during the years 2015- to 2018

Year	Punjab	
	Number of Tickets	Number of Passengers
2015	2400	2200
2016	2300	2000
2017	2600	2500
2018	2800	2460
Total	10100	9160

In which year was the number of people who travelled as a percentage of those who booked tickets, the minimum?

- (a) 2017 (b) 2016
(c) 2018 (d) 2015

RRB NTPC 04.03.2021 (Shift-I) Stage Ist

Ans. (b) : According to the question,

$$\text{During year 2015} = \frac{2200}{2400} \times 100 = 91.66\%$$

$$\text{During year 2016} = \frac{2000}{2300} \times 100 = 86.95\%$$

$$\text{During year 2017} = \frac{2500}{2600} \times 100 = 96.15\%$$

$$\text{During year 2018} = \frac{2460}{2800} \times 100 = 87.86\%$$

So, it is clear that in year 2016 the number of people who travelled as a percentage of those who booked tickets is minimum.

57. The given table shows the number of students graduated from 4 different departments namely Mathematics, History, Urdu and English during 5 consecutive years.

Name of the Departments	Years				
	2014	2015	2016	2017	2018
Mathematics	250	150	275	255	310
History	80	60	55	85	75
Urdu	58	64	50	60	55
English	40	35	52	38	30

What is the ratio of the number of students who graduated from Department of Urdu in the year 2015 to the total number of students who graduated from Department of Urdu for all the years?

- (a) 13 : 111 (b) 46 : 287
(c) 64 : 287 (d) 14 : 102

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Ans. (c) : No. of Urdu students in 2015 = 64
Total No. of graduated Urdu students in all years
= 58+64+50+60+55
= 287

So, required ratio = 64 : 287

58. The given table presents the sales figures of Physics and Chemistry books in the years 2003, 2004, 2005 and 2006.

Years	2003	2004	2005	2006
Physics	300	425	475	515
Chemistry	450	550	590	700

In which year was the difference in the sale of the two subject books the least

- (a) 2005 (b) 2006
(c) 2003 (d) 2004

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (a) : Sales difference in years of Physics and Chemistry

2003	2004	2005	2006
↓	↓	↓	↓
450	550	590	700
-300	425	475	515
150	125	115	185

Hence, the difference in sale of the two subject books least was in 2005.

59. According to the given table, what is the percentage of the total students who failed considering all the three classes i.e. 10th, 11th and 12th and in all five given subjects?

Class	Subjects	Pass % of Students	No. of Failed Students
10 th	Maths	65	105
10 th	Hindi	80	120
11 th	English	40	360
12 th	Psychology	75	100
12 th	Biology	50	110

- (a) 36.7 (b) 37.5
(c) 38.6 (d) 31.8

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (b) : From given table,

Total no. of students of class 10

$$= \frac{105}{35} \times 100 + \frac{120}{20} \times 100$$

$$= 300 + 600 = 900$$

$$\text{Total no. of students in class 11} = \frac{360}{60} \times 100 = 600$$

$$\text{Total no. of students in class 12} = \frac{100}{25} \times 100 + \frac{110}{50} \times 100$$

$$= 400 + 220 = 620$$

$$\text{Total no. of students} = 900 + 600 + 620 = 2120$$

$$\text{Total number of students failed} = 795 [105 + 120 + 360 + 100]$$

$$\text{Required percentage} = \frac{795 \times 100}{2120} = 37.5$$

60. According to the given table, what is the ratio of total students who passed to total students who failed considering all the three classes i.e. 10th, 11th and 12th and all the five given subjects?

Class	Subjects	Pass % of Students	No. of Failed Students
10 th	Maths	65	105
10 th	Hindi	80	120
11 th	English	40	360
12 th	Psychology	75	100
12 th	Biology	50	110

- (a) 265 : 159 (b) 275 : 139
(c) 173 : 138 (d) 369 : 141

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (a) : From given table,

Pass students : Failed students

195 105

480 120

240 360

300 100

110 110

1325 : 795

Passed students : Failed students = 1325 : 795 = 265 : 159

61. The given table shows the number of electric bulbs sold in a shop during a week:

Day	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.
Number of bulbs sold	225	100	150	200	75	90

On which day was the daily sale closest to the average sale for the week?

- (a) Wednesday (b) Friday
(c) Thursday (d) Saturday

RRB NTPC 05.01.2021 (Shift-I) Stage Ist

Ans. (a) : From the table,

Average sale of week

$$= \frac{225 + 100 + 150 + 200 + 75 + 90}{6}$$

$$= \frac{840}{6} = 140$$

So, the sale on Wednesday is closest to the week's average sales.

62. If a pie chart is drawn based on the data given below, what will be the central angle for food?

No. of families	Item of expenditure
150	Education
400	Food
40	Rent
250	Electricity
160	Miscellaneous

- (a) 150° (b) 208°
(c) 144° (d) 90°

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (c) : Total number of families = 150 + 400 + 40 + 250 + 160 = 1000

If we make pie chart, 1000 = 360°

Expenditure on food = 400

Hence, central angle for food = $\frac{360^\circ}{1000} \times 400 = 144^\circ$

63. The following table shows the marks obtained by two students, Raj and Rohit, in different subjects.

Subject	Raj	Maximum Marks	Rohit	Maximum Marks
Math	37	50	48	50
Physics	45	50	30	50
Chemistry	42	50	45	50
Biology	32	50	35	50

What is the difference between Rohit and Raj's percentage of aggregate marks?

- (a) 5% (b) 4%
(c) 2% (d) 1%

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (d) : Total percentage marks obtained by Raj =

$$\frac{\text{Sum of marks}}{\text{Total marks}} \times 100 = \frac{37 + 45 + 42 + 32}{200} \times 100$$

$$= \frac{156}{2} \%$$

$$= 78\%$$

Total percentage marks obtained by Rohit

$$= \frac{48 + 30 + 45 + 35}{200} \times 100$$

$$= \frac{158}{2}$$

$$= 79\%$$

Required difference = 79 - 78

$$= 1\%$$

64. Details of expenses made by a company (in millions) under different heads of expenditure are given in the following table. Study the table and answer the question that follows.

Years	Head of Expenditure				
	Transport	Admin	Salary	Other	Taxes
2014	452	167	340	56	47
2015	569	174	398	62	56
2016	659	189	409	73	61
2017	706	193	456	77	63
2018	783	203	479	81	69

The total expenditure made on the payment of Admin in 2018 was approximately what percentage of the total expenditure made on all heads for that year?

- (a) 1257% (b) 1.257%
(c) 125.7% (d) 12.57%

RRB NTPC 02.03.2021 (Shift-I) Stage Ist

Ans. (d) : From the given table—

Total expenditure on Admin in the year 2018 = 203 million

Total expenditure on all heads in the year 2018

$$= 783 + 203 + 479 + 81 + 69$$

$$= 1615 \text{ million}$$

$$\text{Required percentage} = \frac{203}{1615} \times 100 = 12.57\%$$

Note (65-67): Read the information given below and answer the questions given below.

The information of the number of sitting, answering and selected candidates from Delhi in competitive examination between 1997 and 2001 is given below.

Year	Sitting in examination	Passed	Selected
1997	8000	850	94
1998	4800	500	48
1999	7500	640	82
2000	9500	850	90
2001	9000	800	70

65. In which year was the minimum percentage of selected candidates among the candidates.

- (a) 1998 (b) 2000
(c) 2001 (d) 1999

RRB NTPC 28.04.2016 Shift : 2

Ans.(c) Percentage of selected candidates in the year 1997

$$= \frac{94 \times 100}{8000} = 1.175\%$$

 Percentage of selected candidates in the year 1998

$$= \frac{48 \times 100}{4800} = 1\%$$

 Percentage of selected candidates in the year 1999

$$= \frac{82 \times 100}{7500} = 1.093\%$$

 Percentage of selected candidates in the year 2000

$$= \frac{90 \times 100}{9500} = 0.947\%$$

 Percentage of selected candidates in the year 2001

$$= \frac{70 \times 100}{9000} = 0.7778\%$$

 So, the percentage of selected candidates in the year 2001 is minimum.

- 66. In which year the ratio of the number of selected candidates to the number of passed candidates was maximum.**
 (a) 1998 (b) 2000
 (c) 2001 (d) 1999

RRB NTPC 28.04.2016 Shift : 2

Ans. (d) : From option,
 Ratio in year 1998 = $\frac{48}{500} = 0.096$
 Ratio in year 2000 = $\frac{90}{850} = 0.1058$
 Ratio in year 2001 = $\frac{70}{800} = 0.0875$
 Ratio in year 1999 = $\frac{82}{640} = 0.128$
 Hence, the ratio of the number of selected candidates to the number of passed candidates in year 1999 is the maximum.

- 67. What is the average number of selected candidates in the given interval.**
 (a) 79 (b) 77
 (c) 76 (d) 74

RRB NTPC 28.04.2016 Shift : 2

Ans. (b) : Average number of selected candidates

$$= \frac{94 + 48 + 82 + 90 + 70}{5} = \frac{384}{5} = 76.8 \approx 77$$

Note (68-69): The following table shows the population details based on poverty line and gender in 5 Stages M, N, O, P and Q.

Stage	Population of below poverty line %	The ratio of male (M) and female (F)	
		Below poverty line	Above poverty line
		M : F	M : F
M	40	7 : 6	8 : 7
N	30	3 : 2	6 : 5
O	26	1 : 1	4 : 3
P	17	1 : 2	4 : 5
Q	20	2 : 3	3 : 4

- 68. If the men population of Stage O above the poverty line is 1.7 million then what will be the total population of Stage O.**

- (a) 4.62 million (b) 11.44 million
 (c) 5.63 million (d) 4.02 million

RRB NTPC 28.04.2016 Shift : 1

Ans. (d) : \therefore Male population of Stage O above the poverty line = 1.7 millions

$$\therefore \text{Female population} = \frac{3}{4} \times 1.7 = \frac{5.1}{4} = 1.275 \text{ million}$$

$$\text{Total population above the poverty line} = 1.7 + 1.275 = 2.975$$

$$\text{Population (\%)} \text{ above the poverty line Stage O} = 100 - 26 = 74\%$$

$$\therefore \text{Total population of Stage O} = \frac{2.975 \times 100}{74} = 4.02 \text{ million}$$

- 69. What will be the female population above the poverty line of Stage P if it is known that the total population of Stage P is 9 million.**

- (a) 4.32 million (b) 5.32 million
 (c) 4.15 million (d) 6.32 million

RRB NTPC 28.04.2016 Shift : 1

Ans. (c) : Total population of P Stages = 9 million

$$\therefore \text{Population of Stage P above the poverty line} = 9 \text{ million's } 83\% = 9 \times \frac{83}{100} = \frac{747}{100} = 7.47 \text{ million}$$

\therefore Ratio of male to female in population of Stage P above the poverty line = 4:5

$$\therefore \text{Female population above poverty line} = \frac{5}{4+5} \times 7.47 = \frac{5}{9} \times 7.47 = \frac{37.35}{9} = 4.15 \text{ million}$$

Note (70) : The following table shows the record of a football team's performance in 7 tournaments played for 4 years.

Record of played tournaments	Won matches	Loose matches	The no. of total played matches
I	5	3	8
II	4	4	8
III	5	2	7
IV	6	3	9
V	4	2	6
VI	3	3	6
VII	2	4	6

- 70. In what percentage of the matches played the team won.**

- (a) 58% (b) 80%
 (c) 75% (d) 52%

RRB NTPC 19.01.2017 Shift : 3

Ans. (a) : Total matches played = 50

Total matches won = 29

$$\text{Required \%} = \frac{29}{50} \times 100 = 58\%$$

Note (71- 73): Study the following tables and answer the questions based on it

The following tables gives the company's investment for a few years as a per year.

year	Expense of details				
	Salary	Fuel and Transport	Bonus	Interest on dept	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

71. The company's total expenditure on goods during the year 2001 is.

- (a) Rs. 590 lakhs (b) Rs. 598 lakhs
(c) Rs. 597 lakhs (d) Rs. 597.08 lakhs

RRB NTPC 11.04.2016 Shift : 1

Ans. (d) : Total expenditure of the company on goods during the year 2001 = $336 + 133 + 3.68 + 36.4 + 88$
= Rs. 597.08 lakhs

72. What is the ratio between the total expenditure on tax for all the years and the total bonus for all the years in order.

- (a) 9 : 40 (b) 25 : 13
(c) 451 : 17 (d) 1 : 25

RRB NTPC 11.04.2016 Shift : 1

Ans. (c) : Total expenditure on taxes for all years
= $83 + 108 + 74 + 88 + 98$
= 451
Total bonus for all years = $3 + 2.52 + 3.84 + 3.68 + 3.96$
= 17.00
∴ Intended ratio = 451 : 17

73. What is the percentage of expenditure on salary in the year 2001 on fuel and transport forms.

- (a) 34.54% (b) 39.58%
(c) 33.57% (d) 37.58%

RRB NTPC 11.04.2016 Shift : 1

Ans. (b) : In year 2001,
Expense on fuel and transport = 133 lakhs
Expense on salary = 336 lakhs
∴ Intended percentage = $\frac{133}{336} \times 100$
= 39.58%

Note (74-46): The following table shows the number of MSD, VK, RD and SR fans in different areas of the city. Consider the following information and answer the following question based on it.

	Area 1	Area 2	Area 3	Area 4
VK	2500	1700	2300	5000
MSD	3000	3000	4000	3100
RD	1500	3500	4500	5200
SR	1500	4000	3500	2500

74. What is the difference between total number of fans of SR and MSD?

- (a) 1500 (b) 1600
(c) 3000 (d) 3200

RRB NTPC 19.04.2016 Shift : 2

Ans. (b) : Total number of SR's fan-
= $1500 + 4000 + 3500 + 2500 = 11500$
Total number of MSD's fan
= $3000 + 3000 + 4000 + 3100 = 13100$
Required difference = $13100 - 11500$
= 1600

75. Whose fans are largest?

- (a) VK (b) MSD
(c) RD (d) SR

RRB NTPC 19.04.2016 Shift : 2

Ans. (c) : Number of VK's fan
= $2500 + 1700 + 2300 + 5000 = 11500$
Number of MSD's fan
= $3000 + 3000 + 4000 + 3100 = 13100$
Number of RD's fan
= $1500 + 3500 + 4500 + 5200 = 14700$
Number of SR's fan
= $1500 + 4000 + 3500 + 2500 = 11500$
So, it is clear that maximum number of fan (14700) is of RD

76. What is difference between number of fans in area 2 as compared to area 3.

- (a) Area 2 to 2200 fans more
(b) Area 2 to 2100 fans less
(c) Area 2 to 2100 fans more
(d) Area 2 to 2200 fans less

RRB NTPC 19.04.2016 Shift : 2

Ans. (b) : Number of fans of area- 2
= $1700 + 3000 + 3500 + 4000 = 12200$
Number of fans of area-3 = $2300 + 4000 + 4500 + 3500$
= 14300
Required difference = $14300 - 12200 = 2100$
Hence, it is clear that in area-2 has minimum 2100 fans as compare to area-3

Instruction (103-105): Study the given data and answer the question that follow (In lakh hectares)

Stage	2011	2012	2013
Punjab	220	256	264
Haryana	120	108	151
Uttar Pradesh	100	143	128
Madhya Pradesh	40	85	90
Maharastra	80	150	175
Rajasthan	30	26	24

77. What was the percentage of increase in agriculture land in Punjab in 2013 compared to year 2011?

- (a) 20 (b) 16.36
(c) 25.8 (d) 22.33

RRB NTPC 18.01.2017 Shift : 2

Ans. (a) : Required increased = $\frac{(264 - 220) \times 100}{220}$
 $\Rightarrow \frac{44 \times 100}{220} = 20\%$

78. What is the difference in the total agriculture area of lakh hectares of Maharashtra and M.P. on a combined bases in all 3 years.

- (a) 135 lakh hectares (b) 34 lakh hectares
(c) 190 lakh hectares (d) 174 lakh hectares

RRB NTPC 18.01.2017 Shift : 2

Ans. (c)

Difference in total agriculture area of Maharashtra and Madhya Pradesh

$$\Rightarrow (80+150+175) - (40+85+90)$$

$$\Rightarrow 405-215 = 190 \text{ lakh hectares}$$

79. What was the maximum agriculture area in U.P. as compared to Rajasthan in the year 2012.

- (a) 35 lakh hectares (b) 117 lakh hectares
(c) 113 lakh hectares (d) 58 lakh hectares

RRB NTPC 18.01.2017 Shift : 2

Ans : (b) Agriculture area of 2012 Uttar Pradesh
Agriculture area of 2012 Rajasthan

$$143-26 = 117 \text{ lakh hectares}$$

Instruction (80-82): Take of the following table and answer the question based on it.

The marks scored by the students in various subject in an examination are given below.

Student	Subject			
	Physics (In 120)	Chemistry (In 120)	Biology (In 120)	Mathematics (In 100)
Anil	95	53	61	70
Binu	105	84	42	80
Chirag	95	65	73	90
Dhawan	85	65	84	60
Alza	85	66	95	50
Farah	75	77	85	40
George	65	38	75	80

80. How many students have scored more than 60% in the exam.

- (a) 7 (b) 6
(c) 5 (d) 4

RRB NTPC 04.04.2016 Shift : 3

Ans. (b) :

$$\text{Anil's percentage marks} = \frac{95+53+61+70}{120+120+120+100} \times 100$$

$$= \frac{279}{460} \times 100 = 60.65\%$$

Similarly,

Binu's percentage marks

$$= \frac{105+84+42+80}{460} \times 100$$

$$= \frac{311}{460} \times 100 = 67.60\%$$

$$\text{Chirag's percentage marks} = \frac{95+65+73+90}{460} \times 100$$

$$= \frac{323}{460} \times 100 = 70.21\%$$

Dhawan's percentage marks

$$= \frac{85+65+84+60}{460} \times 100 = \frac{294}{460} \times 100 = 63.91\%$$

Alza's percentage marks

$$= \frac{85+66+95+50}{460} \times 100 = \frac{296}{460} \times 100 = 64.34\%$$

Farah's percentage marks

$$= \frac{75+77+85+40}{460} \times 100 = \frac{277}{460} \times 100 = 60.21\%$$

George's percentage marks

$$= \frac{65+38+75+80}{460} \times 100 = \frac{258}{460} \times 100 = 56.08\%$$

Hence the remaining 6 students except George have scored more than 60%

81. Who is first in class in terms of total percentage mark in the exam.

- (a) Binu (b) Chirag
(c) Dhawan (d) Alja

RRB NTPC 04.04.2016 Shift : 3

Ans. (b) : The percentage of Chirag is the highest in the class (70.21%). See the explanation of the above question.

82. What is the average of marks by Dhawan in all 4 subjects?

- (a) 65.3 (b) 71.3
(c) 68.3 (d) 73.5

RRB NTPC 04.04.2016 Shift : 3

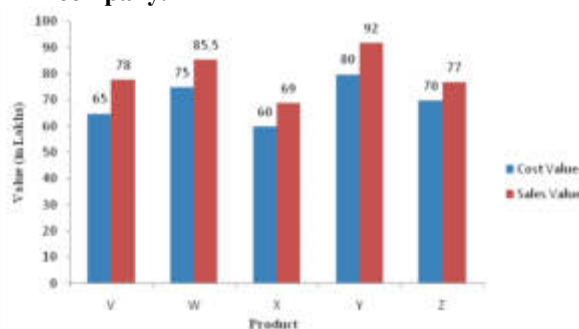
$$\text{Ans. (d) : Dhawan's average score} = \frac{85+65+84+60}{4}$$

$$= \frac{294}{4} = 73.5$$

Type - 3 Problems Based on Bar Graph

83. Study the given graph and answer the question that follows.

The graph shows the total cost and sales values (in lakhs) of five products manufactured by a company.



(Reference- Values (in lakhs), product Cost Value, Sales Value)

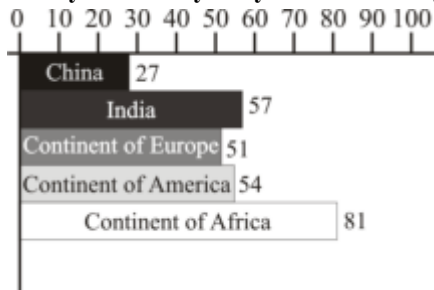
In which product did the company earn maximum profit ?

- (a) Product W (b) Product X
(c) Product V (d) Product Z

RRB NTPC (Stage-2) 17/06/2022 (Shift-III)

Ans. (c) : It is clear from the above table
Product V has earned maximum profit-
 $7800000 - 6500000 = ₹1300000$

84. The following graph represents the number distribution of all the directors in the film industry of country X by their birth origin.



What is the ratio of the number of directors from the continent of America to the total number of directors?

- (a) 1 : 3 (b) 1 : 4
(c) 1 : 6 (d) 1 : 5

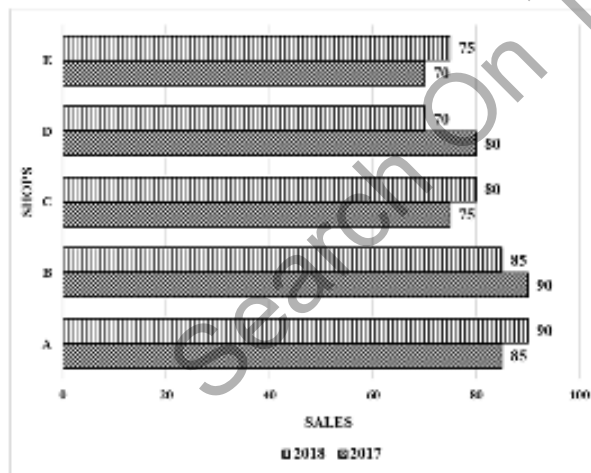
RRB NTPC (Stage-2) 12/06/2022 (Shift-II)

Ans. (d) : Number of directors born in continent of America : Total number of directors

$$= 54 : 270$$

$$= 1 : 5$$

85. The given bar graph shows the sales of inverters of five different shops, A, B, C, D and E, in the years 2017 and 2018.



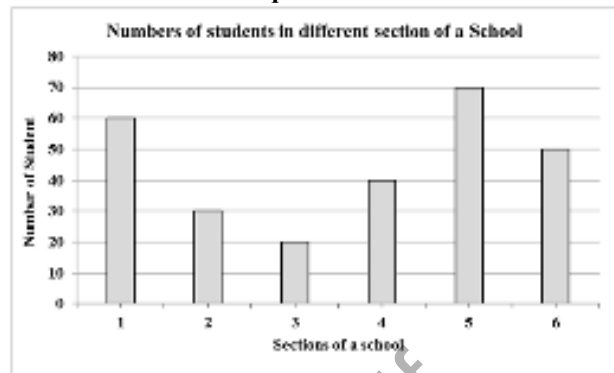
What is the ratio of the total sales of shop A for both the years to that of shop D for both the years?

- (a) 5:3 (b) 6:5
(c) 1:3 (d) 7:6

RRB NTPC 02.02.2021 (Shift-I) Stage Ist

Ans. (d) : According to the question:-
Total sales of shop A in both the years = $90 + 85 = 175$
Total sales of shop D in both the years = $70 + 80 = 150$
Required ratio = $175 : 150 = 7 : 6$

Direction - (86 - 89): Observe the bar graph showing the number of students in different sections of a school and answer the question.



86. The strength of which of the following two sections is in the ratio of 1 : 3 ?

- (a) Sections 2 and 5 (b) Sections 3 and 1
(c) Sections 3 and 5 (d) Sections 2 and 6

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (b) : From options,
Ratio of number of students in section 2 and 5 = $30 : 70 = 3 : 7$
Ratio of number of students in section 3 and 1 = $20 : 60 = 1 : 3$
Ratio of number of students in section 3 and 5 = $20 : 70 = 2 : 7$
Ratio of number of students in section 2 and 6 = $30 : 50 = 3 : 5$
Hence, it is clear from above, option (b) is correct.

87. Which of the sections given below has exactly double the number of students as compared one of the other sections?

- (a) 3 (b) 4
(c) 5 (d) 2

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (b) : As per the graph,
Section with the lowest number of students is 3 in which the number of students is 20.
Number of students in section 3 = 20
Number of students in section 4 = 40
Hence, option (b) is correct.

88. What is the difference between the average number of students in the 3 most populated sections and the 3 least populated sections?

- (a) 50 (b) 20
(c) 40 (d) 30

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (d) : Average of students in 3 highest populated sections – Average of students in 3 least populated sections.

$$= \frac{60 + 70 + 50}{3} - \frac{40 + 30 + 20}{3}$$

$$= 60 - 30$$

$$= 30$$

89. Which section has nearly the average number of students when compared with all the 6 sections of the graph?

- (a) Section 2 and 3 (b) Section 4 and 6
(c) Section 1 and 3 (d) Section 4 and 5

RRB NTPC 13.01.2021 (Shift-II) Stage Ist

Ans. (b) : Average number of students in six sections

$$= \frac{60 + 30 + 20 + 40 + 70 + 50}{6}$$

$$= 45$$

Average of section 4 and 6.

$$= \frac{40 + 50}{2} = \frac{90}{2} = 45$$

Hence, the required sections are 4 and 6.

90. The following bar graph shows the quantity (in number of containers) and value (in Rupee crores) of India's textile exports for 4 years. Based on the graph answer the question given below.

quantity - value, India's textile export.

In which year the value per container was minimum?



- (a) 2nd year (b) 1st year
(c) 3rd year (d) 4th year

RRB NTPC 11.03.2021 (Shift-I) Stage Ist

Ans. (d) : Value per container in 1st year = $\frac{340}{400} = ₹0.85$

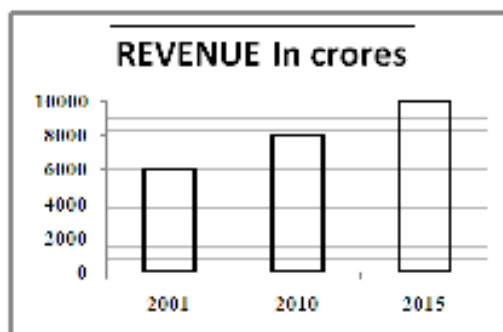
$$\text{Value per container in 2nd year} = \frac{270}{280} = ₹0.96$$

$$\text{Value per container in 3rd year} = \frac{280}{350} = ₹0.80$$

$$\text{Value per container in 4th year} = \frac{350}{450} = ₹0.77$$

Hence, it is clear that the value per container was minimum in 4th year.

91. The revenue earned by Company A in 2001 is ₹ 6,300 crore, that earned in 2010 is ₹ 8,100 crore and that earned in 2015 is ₹ 10,800 crore. What is the ratio of the increase in revenue between 2001 to 2010 and between 2010 to 2015?



- (a) 1 : 2 (b) 2 : 3
(c) 1 : 1 (d) 3 : 2

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (b) : Given-

Revenue earned by the company in 2001 = ₹6,300 crore

Revenue earned by the company in 2010 = ₹8,100 crore

Revenue earned by the company in 2015 = ₹10,800 crore

Increase in revenue between 2001 and 2010 = ₹8100 - ₹6300 = ₹1800 crore

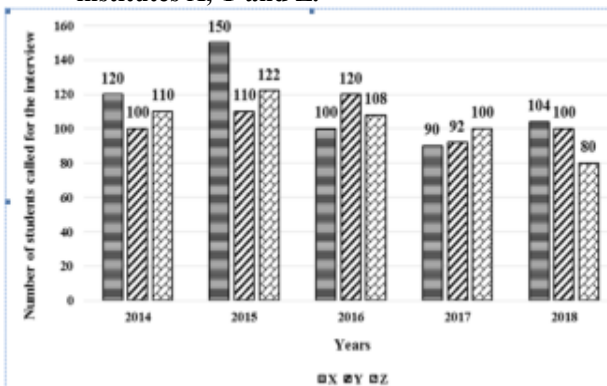
Increase in revenue between 2010 and 2015 = ₹10800 - ₹8100 = ₹2700 crore

Ratio of increase in revenue between 2001 to 2010 and

$$2010 \text{ to } 2015 = \frac{1800}{2700}$$

$$= \frac{2}{3} = 2 : 3$$

92. Observe the bar graph below and answer the question. The bar graph shows the data for the years 2014 to 2018 of the number of students who were called for a job interview of a certain company. The interview was for the post of HR and the students were from three different institutes X, Y and Z.



What is the ratio of the average number of students called for the interview from the institute X during the period 2014 to 2016 to the average number of students from the institute Y called for the interview during the same period ?

(Reference = number of students called for the interview)

- (a) 13 : 43 (b) 37 : 33
(c) 43 : 13 (d) 33 : 37

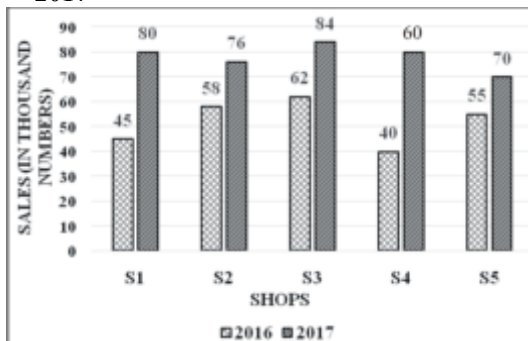
RRB NTPC 09.03.2021 (Shift-II) Stage Ist

Ans. (b) : Average number of students called for interview from institute X during period 2014 to 2016 = $\frac{120+150+100}{3} = \frac{370}{3}$

Average number of students called for interview from institute Y during period 2014 to 2016 = $\frac{100+110+120}{3} = \frac{330}{3}$

Required ratio = $\frac{370}{3} : \frac{330}{3}$
 $= 37 : 33$

93. The given graph shows the sales of hard drives (in thousand numbers) from five different shops S1, S2, S3, S4, S5 in the years 2016 and 2017



What is the ratio of total sales in all the shops in 2016 to that of the total sales in all the shops in 2017?

- (a) 74 : 52 (b) 31 : 42
 (c) 45 : 80 (d) 26 : 37

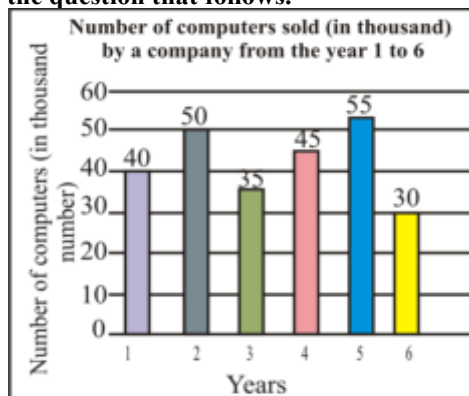
RRB NTPC 07.04.2021 (Shift-II) Stage Ist

Ans. (d) : Total sales of all the shops in 2016
 $= 45 + 58 + 62 + 40 + 55$
 $= 260$

Total sales of all the shops in 2017
 $= 80 + 76 + 84 + 60 + 70$
 $= 370$

So, required ratio = $\frac{260}{370}$
 $= \frac{26}{37} = 26 : 37$

94. Study the given bar chart carefully and answer the question that follows.



The absolute difference between the annual sales in year 4 and the average sales for all six years is the same as the absolute difference between the annual sales in another year and the average sales for all six years. Identify the year.

- (a) Year 4 (b) Year 2
 (c) Year 1 (d) Year 3

RRB NTPC 05.03.2021 (Shift-II) Stage Ist

Ans. (c) : Annual sales in year 4 = 45 thousand
 Avg. sales of all 6 years.

$$= \frac{40 + 50 + 35 + 45 + 55 + 30}{6} = \frac{255}{6} = 42.5 \text{ thousand}$$

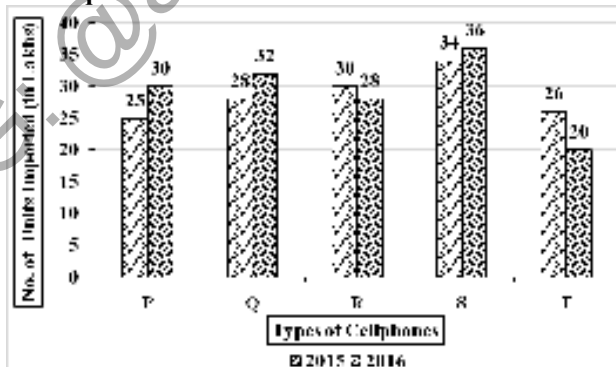
Required difference = $(45 - 42.5)$ thousand
 $= 2.5$ thousand

Annual sales in year 1 = 40 thousand

Required difference = $42.5 - 40 = 2.5$ thousand

Hence, intended year = year 1.

95. The bar graph given below shows the total number of different types of cell phones- P, Q, R, S and T (in lakhs numbers) imported by a company in the year 2015 and 2016, Study the graph carefully and answer the given question.



Which of the following types of cell phones from 2015 to 2016 has the minimum percentage change (increase or decrease) in the number of imported cell phones ?

- (a) P (b) S
 (c) R (d) Q

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (b) : By the given options :

Percentages change of cell-phones—

$$P \rightarrow 30 - 25 \Rightarrow \frac{5}{25} \times 100 = 20\% \text{ (Increase)}$$

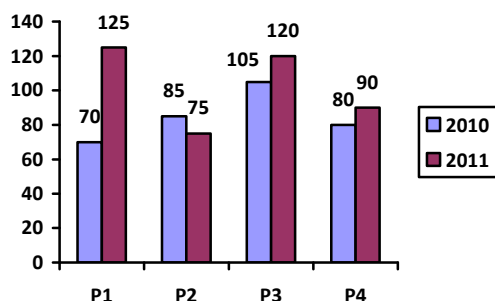
$$S \rightarrow 34 - 36 \Rightarrow \frac{2}{34} \times 100 = 6\% \text{ (Approx) (Increase)}$$

$$R \rightarrow 30 - 28 \Rightarrow \frac{2}{30} \times 100 = 6\frac{2}{3}\% \text{ (Decrease)}$$

$$Q \rightarrow 28 - 32 \Rightarrow \frac{4}{28} \times 100 = 14\frac{2}{7}\% \text{ (Increase)}$$

Hence, the minimum percentage change in the form of growth belongs to company S.

96. The graph given below shows the sales of books (in thousands) from four branches of ABC Publishing House during two consecutive years. What is the ratio of total sales of branch P₂ for that of P₄ for both years?



- (a) 61 : 71
(b) 16 : 17
(c) 71 : 61
(d) 17 : 16

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

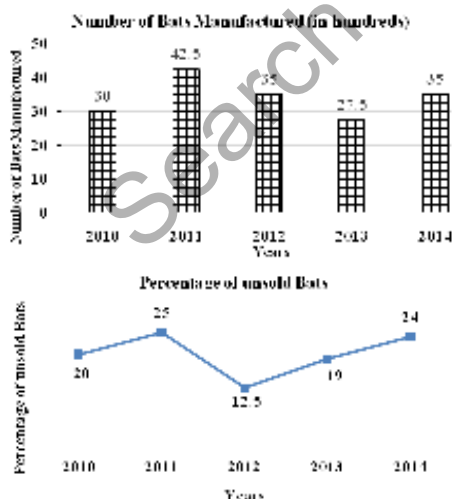
Ans. (b) : From the given graph,

Total sales of branch P₂ for both the years = 85 + 75 = 160

Total sales of branch P₄ for both the years = 80 + 90 = 170

Required ratio = 160 : 170
= 16 : 17

97. The given graph shows the number (in hundreds) of bats manufactured and the following line graph shows the percentage of unsold bats by a factory in Meerut over the period of 2010-2014



What is the difference between the number of bats sold in the year 2010 and year 2014?

- (a) 240
(b) 260
(c) 500
(d) 200

RRB NTPC 08.01.2021 (Shift-I) Stage Ist

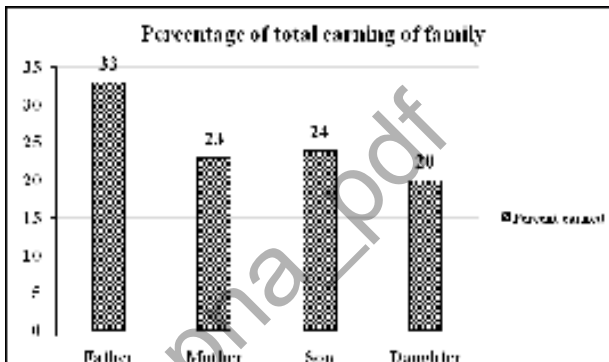
Ans. (b) : Difference between the number of bats sold in the year 2010 and year 2014

$$= 3000 \times 80\% \sim 3500 \times 76\%$$

$$= 2400 \sim 2660 = 2660 - 2400 = 260$$

98. Observe the bar graph and answer the question below.

The total annual earnings of a family of four members is ₹12 lakhs. The bar graph shows the percentage of contribution of each family member.



What is the difference in the salary of the highest and the lowest earning members?

- (a) ₹15,600
(b) ₹11,60,000
(c) ₹1,560
(d) ₹1,56,000

RRB NTPC 04.01.2021 (Shift-II) Stage Ist

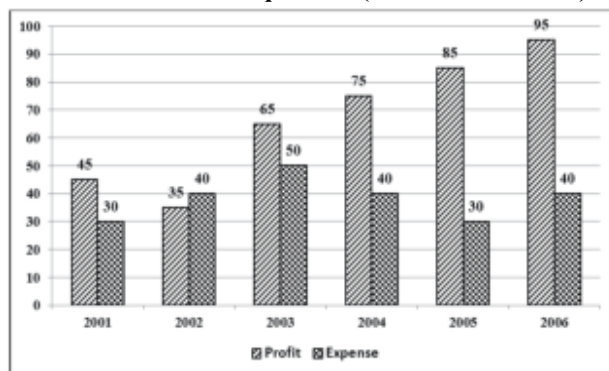
Ans. (d) : According to the given bar graph

Percentage of difference between highest income and lowest income.

$$= (33 - 20)\% = 13\%$$

$$\text{Required difference} = 1200000 \times \frac{13}{100} = ₹ 1,56,000$$

99. Study the following graph showing the Profit and Expense of a Company from 2001 to 2006 and answer the question (Amounts in Lakhs).



For how many years was the profit more than the average profit of the given years

- (a) 1
(b) 3
(c) 2
(d) 4

RRB NTPC 05.03.2021 (Shift-I) Stage Ist

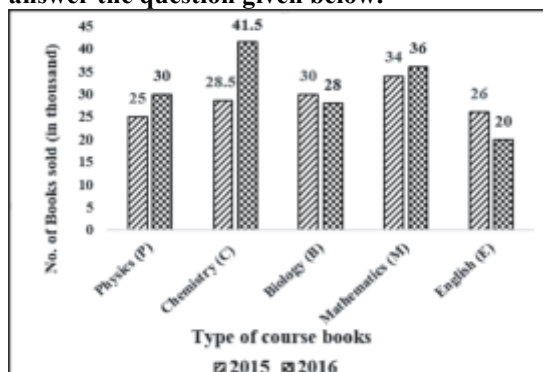
Ans. (b) : Average profit = $\frac{\text{Sum of profits in total years}}{\text{Total number of years}}$

$$= \frac{45 + 35 + 65 + 75 + 85 + 95}{6}$$

$$\text{Average profit} = \frac{400}{6} = 66.66 \text{ lakhs}$$

It is clear from the graph that the profit for three years (2004, 2005 and 2006) (75, 85, 96 lakhs respectively) is more than their average profit (66.66 lakhs).

100. The following bar graph shows the total number of course books for five subjects Physics, Chemistry, Biology, Mathematics and English (in thousands), sold by a printing company in 2015 and 2016. Based on the graph answer the question given below.



Find the percentage of the numbers of Mathematics books sold in 2015, to that of the number of English books sold in 2016.

- (a) 100% (b) 170%
(c) 200% (d) 150%

RRB NTPC 03.03.2021 (Shift-I) Stage Ist

Ans. (b)

Number of Mathematics books sold in 2015 = 34

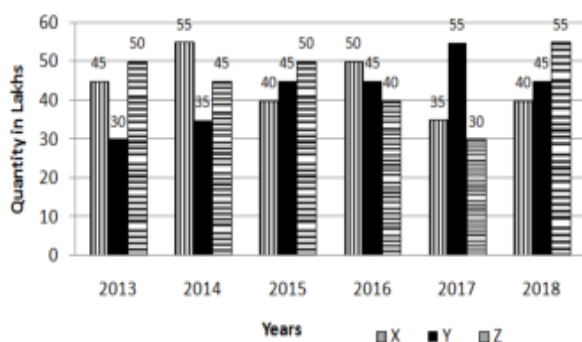
Number of English books sold in 2016 = 20

$$\text{Required percentage} = \frac{34}{20} \times 100 = 34 \times 5 = 170\%$$

101. Observe the given bar graph and answer the question.

The bar graph shows the production of arm chairs by three companies X, Y and Z for the years 2013 to 2018.

Production of arm chairs (in lakh numbers) by three companies over the years



What is the ratio of the production of company Z in 2017 to that of company Y in 2014 ?

- (a) 7 : 6 (b) 6 : 7
(c) 9 : 7 (d) 7 : 9

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (b) :

Production of arm chairs by company Z in year 2017 = 30 lakh

Production of arm chairs by company Y in year 2014 = 35 lakh

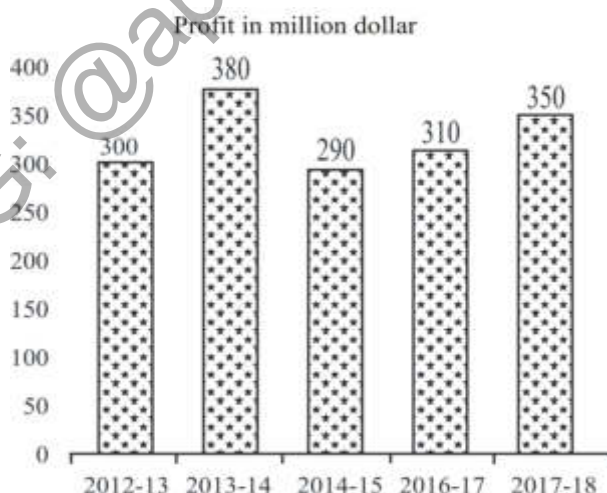
Thus, the ratio of the production of arm chairs of company Z in the year 2017 to that of company Y in the

$$\text{year 2014} = \frac{30}{35} = \frac{6}{7}$$

Hence, required ratio = 6 : 7

102. Observe the given bar graph and answer the question.

The bar graph shows the profit made by a software company (in million \$) from 2012 to 2018.



The profit made by the software company in 2013-2014 was approximately how many times that made in 2014-2015 ?

- (a) 1.31 (b) 2.52
(c) 0.7 (d) 0.5

RRB NTPC 23.02.2021 (Shift-I) Stage Ist

Ans. (a) : Profit earned by software company in 2013 – 2014 = \$380 million

Profit earned by the software company in 2014-2015 = \$ 290 million

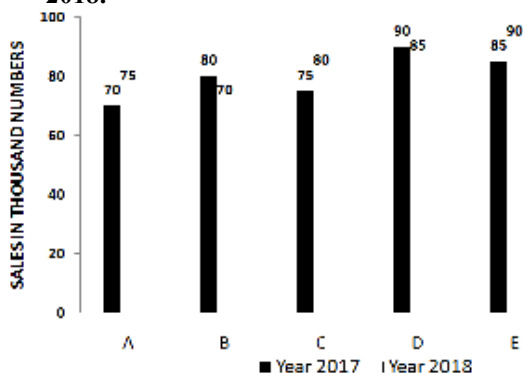
If profit earned by software company in 2013-2014 was x times of profit earned in 2014-2015.

Then,

$$290 \times x = 380$$

$$x = \frac{380}{290} = 1.31$$

103. The following bar graph shows the sales of bicycle (in thousand numbers) from five different shops A, B, C, D and E, in 2017 and 2018.



{Reference- SALES (IN THOUSAND NUMBERS) - बिक्री (in thousands), year}

What is the ratio of the total sales of shop C for both the years to the total sales of shop E for both the years?

- (a) 31 : 35 (b) 35 : 31
(c) 29 : 31 (d) 4 : 5

RRB NTPC 09.02.2021 (Shift-I) Stage Ist

Ans. (a) :

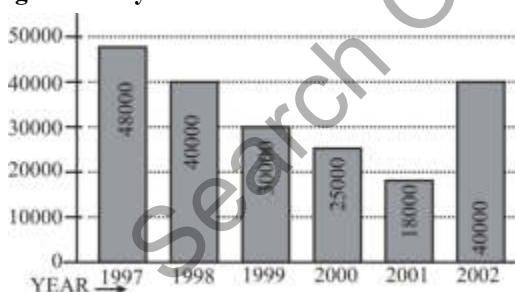
Total sales of shop C in both years = 75 + 80
= 155

Total sales of shop E in both years = 85 + 90
= 175

Ratio of sales of shop C and E = 155 : 175
= 31 : 35

Note (148-150): Study this bar chart and answer the following question.

Following table shows the details of TV sets selling over the years.



104. What is the percentage increment of TV sets selling in years 2001 to 2002 ?

- (a) 115% (b) 128%
(c) 122% (d) 118%

RRB NTPC 30.04.2016 Shift : 2

Ans. (c) : % increase in sales of TV sets from 2001 to 2002

$$= \frac{40000 - 18000}{18000} \times 100$$

$$= \frac{22000 \times 100}{18000} = 122.22\%$$

∴ % increase ≈ 122%

105. The sum of sales for TV sets held in the year 1999 and year 2001 is equal to the sales of which year?

- (a) 1997 (b) 1993
(c) 2000 (d) 2002

RRB NTPC 30.04.2016 Shift : 2

Ans. (a) : The sum of sales of TV sets in the year 1999 and year 2001 = 30,000 + 18,000 = 48,000

Hence, 48,000 sales of T.V. sets is equal to the sales of year 1997.

106. The rate of sales for TV sets has been minimum between which two years?

- (a) 1998 and 1999
(b) 1999 and 2000
(c) 1997 and 1998
(d) 2001 and 2002

RRB NTPC 30.04.2016 Shift : 2

Ans. (b) : From options,

The difference of sales for TV sets between the year 1998 and 1999

$$40000 - 30000 = 10,000$$

The difference of sales for TV sets between the year 1999 and 2000

$$30000 - 25000 = 5,000$$

The difference of sales for TV sets between the year 1997 and 1998

$$48000 - 40000 = 8,000$$

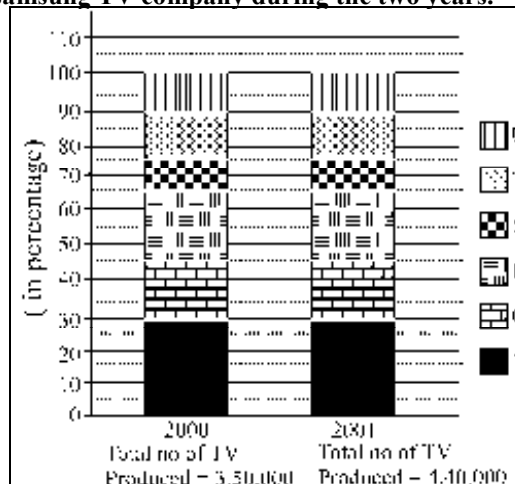
The difference of sales for TV sets between the year 2001 and 2002

$$40000 - 18000 = 22,000$$

Therefore, between year 1999 and 2000, the difference in sales of TV sets was minimum.

Note (107-109): Answer the following questions on the basis of given information.

The bar graph below shows the percentage of distribution of the total production of various models of Samsung TV company during the two years.



107. If percentage of production of Samsung TV in 2001 was same as the year 2000, what would be the number of production of P type Samsung TV in 2001?

- (a) 1,40,000 (b) 1,32,000
(c) 1,17,000 (d) 1,05,000

RRB NTPC 30.04.2016 Shift : 1

Ans. (b) : Number of production of P type Samsung TV in 2001

$$= 440000 \times \frac{30}{100}$$

$$= 132000$$

108. If the company had sold 85% of S type Samsung TV in each year, then how many S-type Samsung TV were not sold?

- (a) 76,500 (b) 93,500
(c) 11,850 (d) 12,2500

RRB NTPC 30.04.2016 Shift : 1

Ans. (c) : Number of S type Samsung TV were not sold

$$= 350000 \times \frac{10}{100} \times \frac{(100-85)}{100} + \frac{440000 \times (100-85)}{100} \times \frac{10}{100}$$

$$= 35000 \times \frac{15}{100} + \frac{44000 \times 15}{100}$$

$$= 5250 + 6600$$

$$= 11850$$

109. What is the total number of Samsung TV manufactured in P, Q and T models in the year 2000?

- (a) 2,45,0000 (b) 2,27,5000
(c) 2,10,000 (d) 1,92,5000

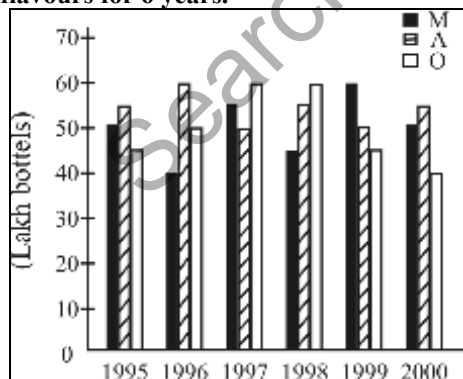
RRB NTPC 30.04.2016 Shift : 1

Ans. (c) : In year 2000, total number of manufactured Samsung TV of P(30%), Q (15%) and T(15%) models

$$= 350000 \times \frac{60}{100} = 210000$$

Note (110-112): Answer the following questions based on the information.

The Coca-Cola company makes drinks in three different flavour Mint (M), Apple (A) and Orange (O). The bar graph below shows the production of the three flavours for 6 years.



110. What is the difference between the average production of flavour mint in years 1995, 1996 and 1997 and the average production of flavour apples in the years 1998, 1999 and 2000.

- (a) 5,000 bottles (b) 80,000 bottles
(c) 2,40,000 bottles (d) 5,00,000 bottles

RRB NTPC 29.04.2016 Shift : 3

Ans. (d) : Average production of flavour mint in year

$$1995, 1996 \text{ and } 1997 = \frac{50+40+55}{3} = \frac{145}{3} \text{ lakh bottles}$$

Average production of flavour apple in year 1998, 1999 and 2000

$$= \frac{55+50+55}{3} = \frac{160}{3} \text{ lakh bottles}$$

$$\therefore \text{Intended difference} = \frac{160}{3} - \frac{145}{3} = 5 \text{ lakh bottles}$$

$$= 5,00,000 \text{ bottles}$$

111. The annual average production of which flavour in the given period is maximum?

- (a) Flavour mint (b) Flavour apple
(c) Flavour orange (d) Mint and apple

RRB NTPC 29.04.2016 Shift : 3

Ans. (b) : Total annual average production of flavour mint

$$= \frac{50+40+55+45+60+50}{6}$$

$$= \frac{300}{6} = 50 \text{ lakh bottles}$$

Total annual average production of flavour apple

$$= \frac{55+60+50+55+50+55}{6}$$

$$= \frac{325}{6} = 54.166 \text{ lakh bottles}$$

Total annual average production of flavour orange

$$= \frac{45+50+60+60+45+40}{6}$$

$$= \frac{300}{6} = 50 \text{ lakh bottles}$$

So, total annual average production of flavour apple is maximum

112. How much did the production of Orange flavour reduce in the year 2000 compared to in the year 1998 ?

- (a) 50% (b) 42%
(c) 33% (d) 25%

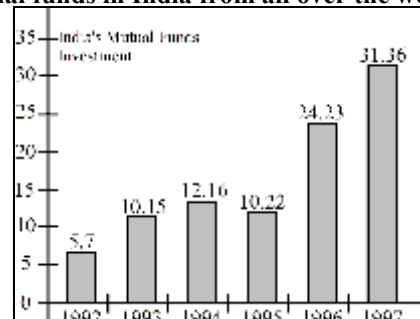
RRB NTPC 29.04.2016 Shift : 3

Ans. (c) : Intended loss % = $\left(\frac{60-40}{60} \right) \times 100$

$$= 33.33\% = 33\%$$

Given the answer of the questions based on the following chart:

Following bar chart shows the polls of investment of mutual funds in India from all over the world.



113. If India's mutual fund investment was proportionately the same as that of the whole of the world mutual fund investment in 1992 and if mutual fund investment from these countries was 2 million euros in 1992, what was the amount of mutual fund investment from these countries in 1997.

- (a) 11 (b) 0.72
(c) 11.28 (d) 11.5

RRB NTPC 27.04.2016 Shift : 1

Ans. (a) : Mutual fund investment ratio in 1992 and 1997

$$= \frac{5.7}{31.66} = \frac{570}{3136} = \frac{285}{1568}$$

Let mutual fund investment is $285x$ and $1568x$ million euro in year 1992 and 1997

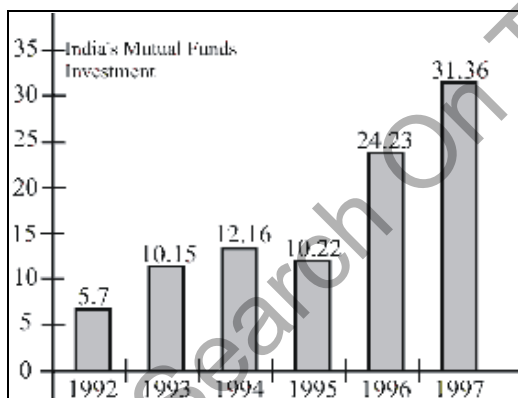
$\therefore 285x = 2$ million euros

$$x = \frac{2}{285}$$

\therefore Quantity of mutual fund investment from the country in 1997

$$= 1568 \times \frac{2}{285} = 11.003 \approx 11 \text{ million euros}$$

The following bar charts refers to the trend of mutual fund's investment in India from around the world.



114. What was the net gap between 1996 and 1997 in investment of mutual fund in India.

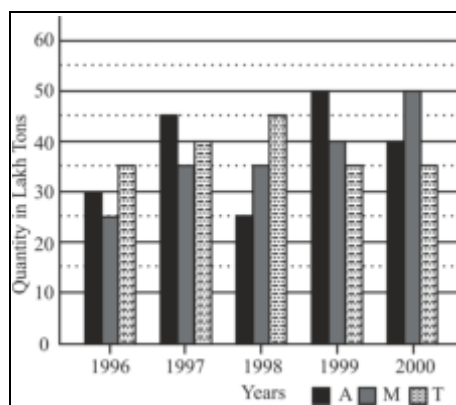
- (a) 7.29 (b) 7.13
(c) 8.13 (d) 7.77

RRB NTPC 27.04.2016 Shift : 1

Ans. (b) : Difference in mutual fund's investment in India from year 1996 to 1997 = $31.36 - 24.23 = 7.13$

Direction (115-117): The following bar diagram is given below in the last few years, three companies Amber paper mill, Mack paper mill and Tanveer paper mill, respectively shown from A, M, T

If the data produced by paper (in lakh tones) Answer the following questions.



115. Which company produces average in five years maximum ?

- (a) Amber paper mill
(b) Mack paper mill
(c) Tanveer paper mill
(d) Both Amber paper mill and Tanveer paper mill

RRB NTPC 07.04.2016 Shift : 1

Ans. (d) : Average production of Amber paper mill

$$(A) = \frac{30 + 45 + 25 + 50 + 40}{5} = \frac{190}{5} = 38$$

Average production of Mack paper mill

$$= \frac{25 + 35 + 35 + 40 + 50}{5}$$

$$M = \frac{185}{5} = 37$$

Average production of Tanveer paper mill

$$= \frac{35 + 40 + 45 + 35 + 35}{5}$$

$$T = \frac{190}{5} = 38$$

Hence, the average production of Amber paper mill and Tanveer paper mill will be equal.

116. In which year the production of Tanveer paper mill was maximum from Mack paper mill.

- (a) 1996 (b) 1997
(c) 1998 (d) 1999

RRB NTPC 07.04.2016 Shift : 1

Ans. (a) : From the options,

Tanveer's production in 1996 = 35

Mack's is production in 1996 = 25

$$\text{Percentage} = \frac{35 \times 100}{25} = 140\%$$

Tanveer's production in 1997 = 40

Mack's production in 1997 = 35

$$\text{Percentage} = \frac{40 \times 100}{35} = 114.2\%$$

Tanveer's production in 1998 = 45

Mack's production in 1998 = 35

$$\text{Percentage} = \frac{45 \times 100}{35} = \frac{9 \times 100}{7} = 1.28 \times 100 = 128\%$$

So, in 1996 Tanveer's production percentage is maximum than Mack's production percentage

117. What is the ratio of average production of Amber paper mill and average production of a Mack paper mill from the time 1998-2000?

- (a) 1 : 1 (b) 15 : 17
(c) 23 : 25 (d) 27 : 29

RRB NTPC 07.04.2016 Shift : 1

Ans. (c) : Average production of Amber paper mill from (1998- 2000)

$$= \frac{25+50+40}{3} = \frac{115}{3}$$

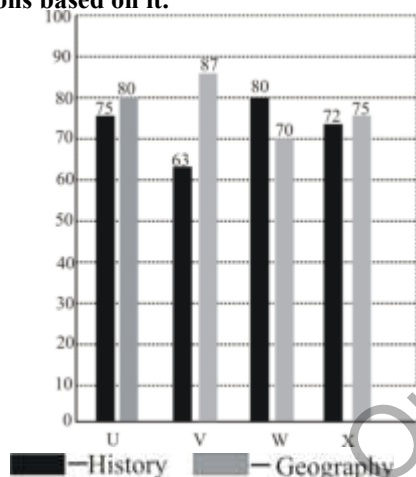
Average production of Mack paper mill from (1998 - 2000)

$$= \frac{35+40+50}{3} = \frac{125}{3}$$

$$\text{Intended ratio} = \frac{115}{3} : \frac{125}{3} = 23 : 25$$

Note (118-120):

The bar chart represents percentage marks scored by four students U, V, W and X in History and Geography. Consider the bar chart and answer the questions based on it.



118. What is the percentage difference in the total marks obtained in Geography and History?

- (a) 7.58% (b) 7%
(c) 4.13% (d) 5.5%

RRB NTPC 03.04.2016 Shift : 2

Ans. (d) : Scored total marks in Geography

$$= 80+87+70+75 = 312$$

Scored total marks in History

$$= 75+63+80+72 = 290$$

Intended difference %

$$= \left(\frac{312}{4} \right) \% - \left(\frac{290}{4} \right) \% = \frac{22}{4} \% = 5.5\%$$

119. What is the average percentage marks obtained in History by all students?

- (a) 78% (b) 75%
(c) 72.5% (d) 70%

RRB NTPC 03.04.2016 Shift : 2

Ans. (c) : Scored average percentage marks in History by all students

$$= \left(\frac{75+63+80+72}{4} \right) = \frac{290}{4} \% = 72.5\%$$

120. Who scored the highest percentage in both the subjects combined?

- (a) Both V and W (b) V
(c) W (d) U

RRB NTPC 03.04.2016 Shift : 2

Ans. (d) :

Got percentage marks in History and Geography by U

$$= \frac{(75+80)}{2} \%$$

$$= \frac{155}{2} \% = 77.5\%$$

Got percentage marks in History and Geography by V

$$= \left(\frac{63+87}{2} \right) \% = \frac{150}{2} \% = 75\%$$

Got percentage marks in History and Geography by W

$$= \left(\frac{80+70}{2} \right) \% = 75\%$$

Got percentage marks in History and Geography by X

$$= \left(\frac{72+75}{2} \right) \% = 73.5\%$$

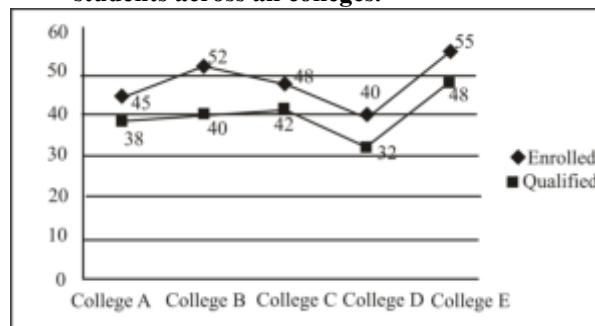
So, percentage marks of U are maximum in both subjects.

Type - 4

Problems Based on Line Graph

121. The following graph represents the number of students enrolled and the number of qualified in five colleges during a particular year.

What is the ratio of enrolled to qualified students across all colleges.



- (a) 13:3 (b) 6:7
(c) 6:5 (d) 3:7

RRB NTPC (Stage-2) 16/06/2022 (Shift-III)

Ans. (c) : Total number of Enrolled Students

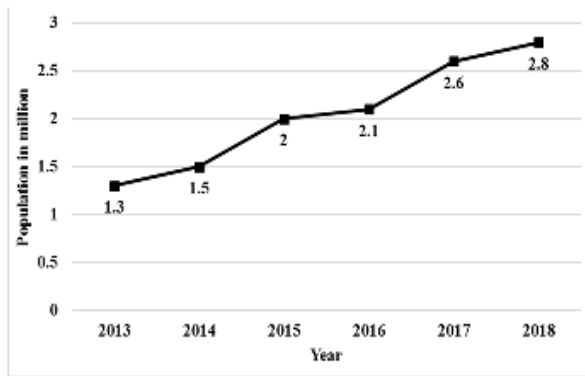
$$= 45+52+48+40+55 = 240$$

Total number of qualified students = 38+40+42+32+48 = 200

$$\text{Required Ratio} = 240 : 200 \\ 6 : 5$$

122. The following line graph shows the population (in million) of Istanbul over 6 years (From 2013 to 2018). Answer the given question based on the line graph.

What is the approximate percentage increase in the population of Istanbul from 2013 to 2018?



- (a) 118% (b) 130%
(c) 115% (d) 120%

RRB NTPC 08.02.2021 (Shift-II) Stage Ist

Ans. (c) : Population of Istanbul in the year 2013 = 1.3 million

Population of Istanbul in the year 2018 = 2.8 million

Required percentage increase

$$= \frac{2.8 - 1.3}{1.3} \times 100$$

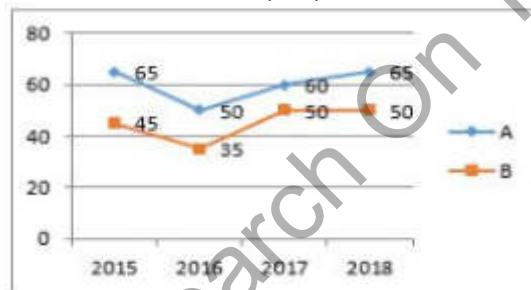
$$= \frac{1.5}{1.3} \times 100$$

$$= 115.38\%$$

$$\approx 115\%$$

123. The given graph shows the percentage of profit gained by two corporate bodies A and B from the year 2015 to 2018.

If the expenditure of A was ₹60 lakhs, then how much was the revenue (in ₹) of A in 2018?



- (a) 50 lakh (b) 100 lakh
(c) 99 lakh (d) 65 lakh

RRB NTPC 29.01.2021 (Shift-II) Stage Ist

Ans. (c) : According to the given graph -

A's expenditure in 2018 = ₹60 lakh

A's profit in 2018 = 65%

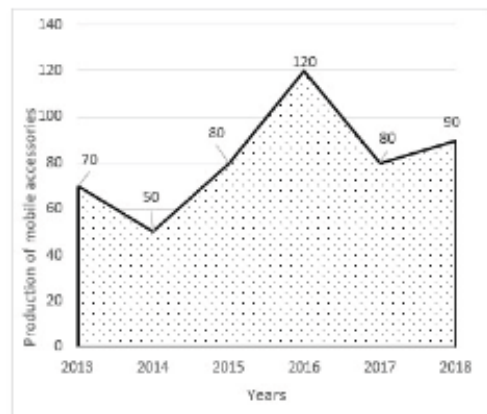
$$\text{A's income} = \frac{6000000 \times 165}{100}$$

$$= ₹9900000$$

$$= ₹99 \text{ lakh}$$

124. The following chart shows the production of mobile accessories (in lakh units) by a company Z over 6 years (from 2013 to 2018). Answer the given question based on the chart.

Find the percentage decrease in the production of mobile accessories from the years 2016 to 2018.



- (a) 50% (b) 40%
(c) 25% (d) 20%

RRB NTPC 08.04.2021 (Shift-I) Stage Ist

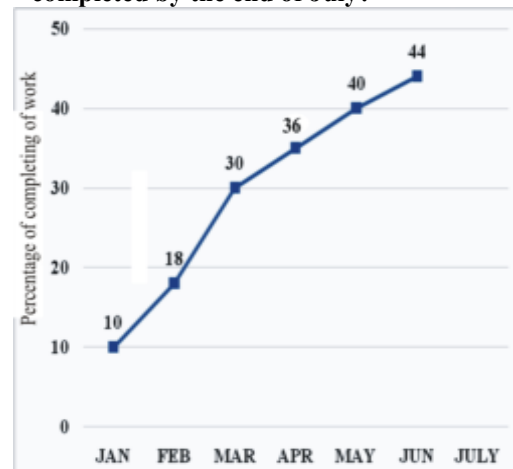
Ans. (c) : The production of mobile accessories in the year 2016 is 120.

The production of mobile accessories in the year 2018 is 90.

Decrease = 120 - 90 = 30

$$\text{Required decrease \%} = \frac{30}{120} \times 100 = 25\%$$

125. The following graph shows the month wise cumulative progress in the constructions of a dam. If the progress in July is equal to that of the highest progress recorded in any month in the given period, how much work will be completed by the end of July?



- (a) 54% (b) 52%
(c) 56% (d) 50%

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (c) : Work progress in January = 10%

Work progress in February = (18 - 10) = 8%

Work progress in March = (30 - 18) = 12%

Work progress in April = (36 - 30) = 6%

Work progress in May = (40 - 36) = 4%

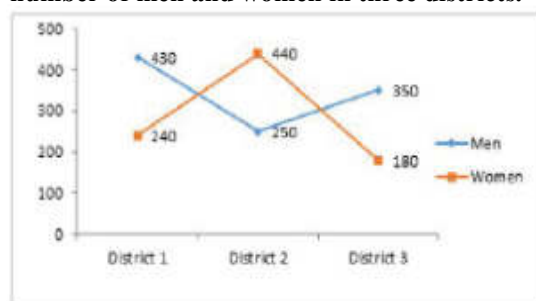
Work progress in June = (44 - 40) = 4%

∴ The highest work progress recorded in March.

∴ Work will be done by the end of July = (44 + 12) = 56%

126. Study the graph and answer the question that follows.

The graph provides the details regarding the number of men and women in three districts.



Based on the numbers given above, If the men were equally distributed from District 1 to District 2 and 3 in a way that the male to female ratio in District 1 becomes 1 : 1, what will be the revised male to female ratio for Districts 2 and 3 together?

- (a) 62 : 79 (b) 27 : 20
(c) 20 : 27 (d) 79 : 62

RRB NTPC 31.01.2021 (Shift-I) Stage Ist

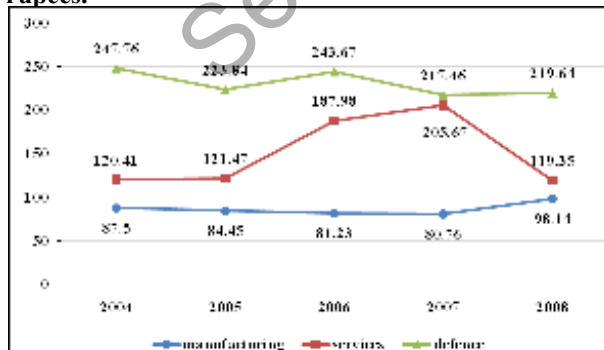
Ans. (d) : Number of male and females in all three districts—

District-1	District-2	District-3
Male-430	Male-250	Male-350
Female-240	Female-440	Female-180

On distributing Men equally from District 1 to District 2 and 3 in a way that the ratio of male to female in District 1 becomes 1 : 1.

$$\begin{aligned}\text{Number of males in District 2} &= 250 + \frac{190}{2} \\ &= 250 + 95 = 345 \\ \text{Number of males in District 3} &= 350 + \frac{190}{2} \\ &= 350 + 95 = 445 \\ \text{Required ratio} &= (345 + 445) : (240 + 180) \\ &= 790 : 420 = 79 : 42\end{aligned}$$

Direction (127–130) : This Chart shows the investment in 3 sectors - manufacturing, services and defence— in five different years. All values are in lakh rupees.



127. Which year has highest investment in all three sectors together?

- (a) 2006 (b) 2005
(c) 2004 (d) 2007

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (a) : Investment in all sectors in the year 2004 = 87.5 + 120.41 + 247.76 = ₹ 455.67 lakhs

Investment in all sectors in the year 2005 = 84.45 + 121.47 + 223.84 = ₹ 429.76 lakhs

Investment in all sectors in the year 2006 = 81.23 + 187.98 + 243.67 = ₹ 512.88 lakhs

Investment in all sectors in the year 2007 = 80.76 + 205.67 + 217.46 = ₹ 503.89 lakhs

So, in the year 2006 has the highest investment in all three sector.

128. Find the difference in lakhs between the investment in the defence and manufacturing sectors in all years together.

- (a) ₹721.28 (b) ₹620.29
(c) ₹720.29 (d) ₹820.27

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (c) : Investment in defence sector in all the years = 247.76 + 223.84 + 243.67 + 217.46 + 219.64

= ₹1152.37 lakh

Investment in manufacturing in all the years = 87.5 + 84.45 + 81.23 + 80.76 + 98.14

= ₹ 432.08 lakh

Required difference = 1152.37 – 432.08 = ₹ 720.29 lakh

129. In which year the investment in services sector is closest to the average investment in services sector over a period of 5 years.

- (a) 2007 (b) 2004
(c) 2008 (d) 2006

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (b) : Average of five years in services sector

$$= \frac{120.41 + 121.47 + 187.98 + 205.67 + 119.35}{5}$$

$$= \frac{754.88}{5} = ₹150.97 \text{ lakh}$$

Investment in service sector in 2004 = ₹ 120.41 lakh

It is clear from the above graph that the investment in the services sector in the year 2004 is approximately closest the average investment in the services sector during the period of 5 years.

130. In which years was the percentage share of investment in the defence sector the lowest as compared to all three sectors for that years.

- (a) 2006 (b) 2007
(c) 2008 (d) 2005

RRB NTPC 29.01.2021 (Shift-I) Stage Ist

Ans. (b) : From option (a)

Required share percentage of investment in defence sector in 2006.

$$= \frac{243.67}{512.88} \times 100 = 47.51\%$$

From option (b)

Required share percentage of investment in defence sector in 2007.

$$= \frac{217.47}{503.89} \times 100 = 43.15\%$$

From option (c)

Required share percentage of investment in defence sector in 2008.

$$= \frac{219.64}{437.13} \times 100 = 50.24\%$$

From option (d)

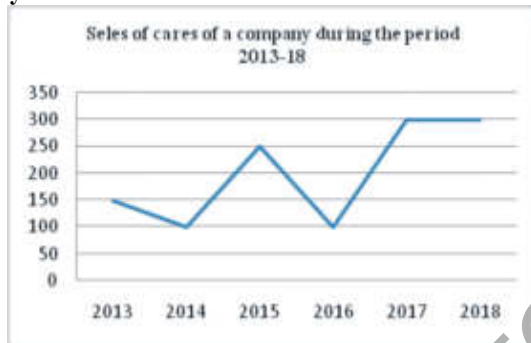
Required share % of investment in defence sector in 2005

$$= \frac{223.84}{(84.45 + 121.47 + 223.84)} \times 100$$

$$= \frac{2238400}{42976} = 52.08\%$$

Hence, the percentage share of investment is lowest in 2007.

131. From the given diagram, determine the difference between the total number of cars sold in the first three years and in the last three years.



- (a) 700 (b) 150
(c) 1200 (d) 200

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

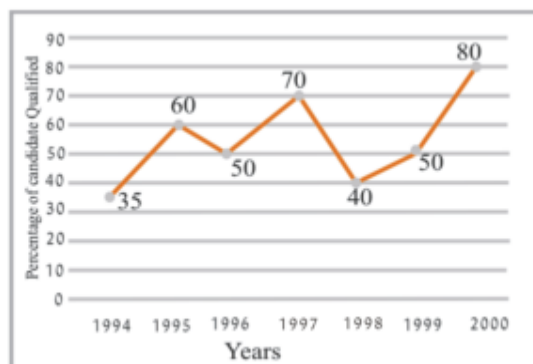
Ans. (d) : Total number of cars sold in first three years
 $= 150 + 100 + 250$
 $= 500$

Total number of cars sold in last three years
 $= 100 + 300 + 300$
 $= 700$

Required difference $= 700 - 500$
 $= 200$

Direction (132-134) Study the given line graph and answer the question that follows.

The line graph shows the percentage of candidates qualified in different years from 1994 to 2000.



132. If the number of candidates qualified in 1994 was 35490, then total number of candidates in that year was

- (a) 101440 (b) 101400
(c) 111400 (d) 111440

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (b) : Number of qualified candidates in 1994 = 35% of total candidates = 35490

Hence, total number of candidates $= \frac{35490}{35} \times 100$
 $= 101400$ students

133. The total number of candidates qualified in 1997 and 1999 together was 53590 and the number of candidates appeared in 1999 was 43060. Candidates qualified in 1997 are what percentage (approximately) of the candidates qualified in 1999?

- (a) 149% (b) 160%
(c) 155% (d) 120%

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (a) : Number of candidates who appeared in the examination in 1999 = 43060

So the number of candidates passed in the year 1999 $= 43060 \times \frac{50}{100} = 21530$ Students

Then the number of candidates passed in 1997 = 53590 - 21530 = 32060 Students

Required percentage $= \frac{32060}{21530} \times 100 = 149\%$

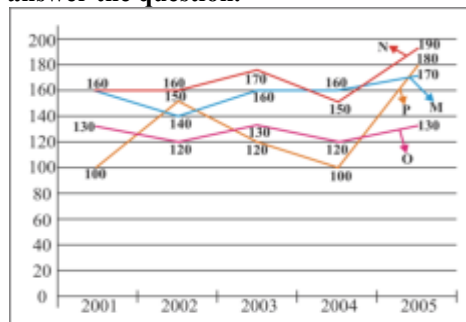
134. Which of the following Statements about the line graph cannot be inferred?

- (a) The number of candidates qualifying 1996 is the same as the number of candidates qualifying in 1999
 (b) The highest percentage of candidates qualified in the year 2000
 (c) The lowest percentage of candidates qualified in the year 1994
 (d) The percentage of candidates qualifying has risen in 4 periods and fallen in 2 periods between 1994 and 2000

RRB NTPC 08.03.2021 (Shift-II) Stage Ist

Ans. (a) : The Statements given in option (a) cannot be inferred from the given line graph.

Direction (135-138) The given graph shows rainfall in centimetres in the cities M, N, O and P from 2001 to 2005. Study the graph and answer the question.



135. Which city has recorded maximum rainfall on an average?

- (a) M (b) P
(c) O (d) N

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (d) : The average of maximum rainfall in the city between 2001 to 2005.

$$M = \frac{160+140+160+160+170}{5} = 158$$

$$N = \frac{160+160+170+150+190}{5} = 166$$

$$O = \frac{130+120+130+120+130}{5} = 126$$

$$P = \frac{100+150+120+100+180}{5} = 130$$

So, city N has recorded maximum rainfall on an average.

136. For the given period, which two cities are closest to each other in terms of average annual rainfall.

- (a) N and O (b) O and P
(c) M and N (d) M and P

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (b) : $M = \frac{160+140+160+160+170}{5} = 158$

$$N = \frac{160+160+170+150+190}{5} = 166$$

$$O = \frac{130+120+130+120+130}{5} = 126$$

$$P = \frac{100+150+120+100+180}{5} = 130$$

Thus, the average annual rainfall between cities O and P was approximately equal.

137. Which city has the widest range of rainfall over 5 years?

- (a) N (b) P
(c) O (d) M

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (b) : The maximum range of rainfall during 5 years is as follows.

$$\text{Range of city M} - 170 - 160 = 10$$

$$\text{Range of city N} - 190 - 150 = 40$$

$$\text{Range of city O} - 130 - 120 = 10$$

$$\text{Range of city P} - 180 - 100 = 80$$

Hence, city P has the highest rainfall range.

138. Which year recorded highest total rainfall across all the cities?

- (a) 2005 (b) 2001
(c) 2003 (d) 2004

RRB NTPC 17.01.2021 (Shift-I) Stage Ist

Ans. (a) :

$$\text{Total rainfall in 2001} - 160+160+130+100 = 550$$

$$\text{Total rainfall in 2002} - 160+150+140+120 = 570$$

$$\text{Total rainfall in 2003} - 170+160+130+120 = 580$$

$$\text{Total rainfall in 2004} - 160+150+120+100 = 530$$

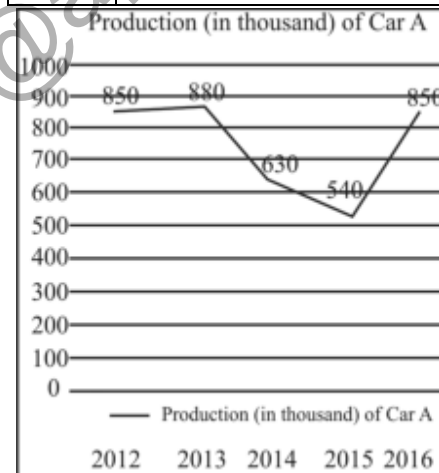
$$\text{Total rainfall in 2005} - 190+180+170+130 = 670$$

So in the year 2005 recorded the highest rainfall across all the cities.

139. The table below shows the ratio of manufacturing of Car A to the manufacturing of Car B by the same company from 2012-2016. The Line Graph shows the manufacturing (in thousands) of Car A, from 2012-2016.

What is the ratio of number of Car B manufactured in 2012 to the number of Car A manufactured in 2014?

Year	Production Ratio of A to B
2012	17:16
2013	8:7
2014	9:10
2015	18:19
2016	7:6



Reference-
production ratio
production of car A

- (a) 79 : 61 (b) 79 : 63
(c) 80 : 61 (d) 80 : 63

RRB NTPC 07.01.2021 (Shift-II) Stage Ist

Ans. (d) : Let production of Car A in 2012 = $17x$ and production of car B in 2012 = $16x$

By line graph-

$$17x = 850$$

$$x = 50$$

And production of Car B in 2012 = $16x$

$$= 16 \times 50$$

$$= 800$$

Production of car 4 in 2014 = 630 [Given]

$$\text{then, Required Ratio} = \frac{800}{630} = 80 : 63$$

Miscellaneous

1. A hundred rupee note measures $15 \text{ cm} \times 8 \text{ cm}$ and a bundle of 125 such notes is 2 cm thick. Find the value of the hundred-rupee notes that can be contained in a box of size $48 \text{ cm} \times 36 \text{ cm} \times 30 \text{ cm}$. If the bundles are tightly packed in it without any empty space.

- (a) ₹ 30 Lakhs (b) ₹ 33 Lakhs
(c) ₹ 36 Lakhs (d) ₹ 27 Lakhs

RRB NTPC (Stage-II) 14/06/2022 (Shift-I)

Ans. (d) : Given,

Measures of ₹100 note = $15 \text{ cm} \times 8 \text{ cm}$.

Thickness of 125 notes = 2 cm.

Measures of box = $48 \text{ cm} \times 36 \text{ cm} \times 30 \text{ cm}$.

$$\therefore \text{Total number of bundles of 125 notes} = \frac{48 \times 36 \times 30}{15 \times 8 \times 2}$$

$$= 216$$

$$\text{Number of notes in 216 bundles} = 216 \times 125$$

$$= 27000$$

$$\text{Hence, Total value of ₹100 notes} = 27000 \times 100$$

$$= ₹2700000$$

$$\text{or 27 Lakhs}$$

2. If the degree of polynomial $9x^5y^2z^r$ is 15, then r = ?

- (a) 7 (b) 6
(c) 8 (d) 9

RRB NTPC 19.01.2021 (Shift-I) Stage Ist

Ans. (c) : Degree of polynomial $9x^5y^2z^r$ is 15.

$$\therefore 5 + 2 + r = 15$$

$$r = 8$$

Hence, value of $r = 8$.

3. A beautician's income includes her salary and the tips she gets for her services. During a particular week, if her tips were $\frac{5}{4}$ her salary, then what fraction of her income came from the tips?

- (a) $\frac{4}{5}$ (b) $\frac{9}{5}$ (c) $\frac{5}{9}$ (d) $\frac{4}{9}$

RRB NTPC 01.02.2021 (Shift-I) Stage Ist

Ans. (c) : Let the salary of beautician = ₹ x

$$\text{And income received in tips} = ₹ \frac{5}{4}x$$

$$\text{Total income} = ₹ \frac{9x}{4}$$

$$\text{Fraction of her income came from the tips}$$

$$= \frac{5x}{4} \times \frac{4}{9x} = \frac{5}{9}$$

$$\text{Hence, } \frac{5}{9} \text{ of the income was received in tips.}$$

4. If $a \oplus b = a - b + \frac{1}{\sqrt{ab}} + \sqrt{\frac{a}{b}}$, then $0.9 \oplus 0.1 = ?$

- (a) $\frac{30}{214}$ (b) $\frac{212}{30}$
(c) $\frac{30}{212}$ (d) $\frac{214}{30}$

RRB NTPC 01.03.2021 (Shift-I) Stage Ist

Ans. (d) : Given,

$$a \oplus b = a - b + \frac{1}{\sqrt{ab}} + \sqrt{\frac{a}{b}}$$

$$\therefore 0.9 \oplus 0.1 = 0.9 - 0.1 + \frac{1}{\sqrt{0.9 \times 0.1}} + \sqrt{\frac{0.9}{0.1}}$$

$$= 0.8 + \frac{1}{\sqrt{0.09}} + \sqrt{9}$$

$$= 0.8 + \frac{1}{0.3} + 3$$

$$= 3.8 + \frac{1}{0.3} = 3.8 + \frac{10}{3}$$

$$= \frac{11.4 + 10}{3} = \frac{21.4}{3} = \frac{214}{30}$$

5. If a vessel gets filled by 15 glasses of milk where capacity of each glass is 1.5 L, How many glasses are required to fill the same vessel if the capacity of each glass is 0.5 L?

- (a) 55 (b) 40
(c) 50 (d) 45

RRB NTPC 31.01.2021 (Shift-II) Stage Ist

Ans. (d) : Capacity of glass = 1.5 L

$$\text{Capacity of vessel} = 1.5 \times 15 = 22.5$$

$$\text{If the capacity of glass is 0.5 L, then the glass required to full the vessel} = \frac{22.5}{0.5} = 45$$

6. A mango kept in a basket doubles in every one minute. If the basket gets completely filled by mangoes in 30 min then in how many minutes half of the basket was filled?

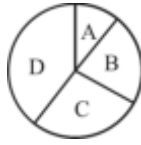
- (a) 29 (b) 15
(c) 27 (d) 28

RRB NTPC 04.01.2021 (Shift-I) Stage Ist

Ans. (a) : According to the question, in every 1 minute the number of mangoes in the basket doubles and the basket is filled completely in 30 minutes.

So, 1 minute before 30 minutes, the basket must have been half basket = $30 - 1 = 29$ minutes.

7. Of the 360 students who sat for class X Board exams, 10% students scored A Grade, 20% students scored B Grade, 30% students scored C Grade and 40% scored D Grade. From the given pie chart, find the total number of students who scored Grade A and Grade B.



- (a) 108 (b) 72
(c) 144 (d) 36

RRB NTPC 28.12.2020 (Shift-II) Stage Ist

Ans. (a) : Total number of students = 360
 $100\% = 360$
 $1\% = 3.6$
 Total number of students who scored Grade A and Grade B = 30%
 $1\% = 3.6$
 $30\% = 108$

8. A map of a city is drawn on a scale of 1 : 50000. The distance between two cities A and B on this map is 12 cm. What will be the actual distance between the two cities?
 (a) 9 km (b) 6 km
 (c) 12 km (d) 15 km

RRB NTPC 19.01.2021 (Shift-II) Stage Ist

Ans. (b) : Representative fraction method is also called numerical measurement method like $\frac{1}{50000}$ means that one part of the map is equal to 50000 part of the surface, so if the distance b/w the two cities on the map 12 cm then actual distance b/w the two cities = $12 \times 50000 = 600000$ cm or 6 km.

9. The earth takes 24 h to rotate about its own axis. Through what angle will it turn in 5 h and 24 min?
 (a) 80° (b) 79°
 (c) 81° (d) 82°

RRB NTPC 09.02.2021 (Shift-II) Stage Ist

Ans. (c) : \therefore Earth make 360° angle in one rotation
 \therefore 24 hours \longrightarrow 360°
 $1 \text{ h} \longrightarrow \frac{360}{24} = \frac{90}{6} = 15^\circ$
 $5 \text{ hours } 24 \text{ min} \rightarrow 15^\circ \times \left(5 + \frac{24}{60}\right)$
 $= 15^\circ \times \frac{27}{5} = 81^\circ$

10. Sonal was given some money to take care of her travel expenses during a 16-day sales drive. However, she had to increase her stay by another 8 day, and as a result her average daily travel allowance went down by Rs 80. How much was sanctioned to her in the beginning?
 (a) ₹3,760 (b) ₹3,750
 (c) ₹3,820 (d) ₹3,840

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (d) : Let daily travel expenses = ₹x
 According to the question-
 $16 \times x = 24 \times (x - 80)$
 $16x = 24x - 1920$
 $x = 240$
 Expenses during the 16 day sales drive.
 $= 16 \times 240$
 $= ₹3840$

11. There is a 6-storey building with 20 room on each floor. Some toxic material is concealed in the building. Three groups of officers start the search operation simultaneously. The first group searches the 1st and 2nd floors. The second group handles the 3rd and 4th floors. The third group takes over the 5th and 6th floors. If it takes 1 minute to reach any nearest floor and 1 minute to search each room, how much time will be taken to complete the entire search operation?

- (a) 126 min (b) 46 min
(c) 40 min (d) 61 min

RRB NTPC 16.01.2021 (Shift-I) Stage Ist

Ans. (b) : There is six storey building, with 20 rooms in each floor.
 \therefore The number of rooms = $20 \times 6 = 120$
 It takes one minute to search each room and one minute to go to each any nearest floor. 3 teams start search operation together, So = $40 + 1 + 2 + 3$
 $= 46$ minutes

12. A map of a city is drawn on a scale 1:150000. The distance between two cities A and B on this map is 6 cm. What will be the actual distance between the two cities?
 (a) 15 km (b) 12 km
 (c) 9 km (d) 6 km

RRB NTPC 20.01.2021 (Shift-I) Stage Ist

Ans. (c) : As per question,
 $1 : 150000$
 $6 \text{ cm} = 900000 \text{ cm}$
 \therefore Actual distance = $\frac{900000}{100 \times 1000} = 9 \text{ km}$

13. If $11 = \frac{11x}{1-x}$, then the value of $(2x)^2$ is:
 (a) 3 (b) 2
 (c) 4 (d) 1

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (d) : Given,
 $11 = \frac{11x}{1-x}$
 $\Rightarrow 11(1-x) = 11x \Rightarrow 11 - 11x = 11x$
 $22x = 11$
 $x = \frac{11}{22} = \frac{1}{2}$
 $\therefore (2x)^2 = \left(2 \times \frac{1}{2}\right)^2 = (1)^2 = 1$

14. If a, b, c, d and e are the digits of a number beginning from the left, then the number is:
 (a) $100a + 10b + 10c + d + e$
 (b) $10^4a + 10^3b + 10^2c + 10d + e$
 (c) edcba
 (d) $1000a + 100b + 10c + 1d + e$

RRB NTPC 04.02.2021 (Shift-I) Stage Ist

Ans. (b) :
 \therefore a, b, c, d and e are in order from left to right
 So, $10000a + 1000b + 100c + 10d + e$
 $= 10^4a + 10^3b + 10^2c + 10d + e$

15. A group of 463 persons were asked to vote for their favourite season out of four seasons (rain, summer, spring and winter). The rainy season got 130 votes, while the summer season got 100 votes. Winter season got 53 more votes than the summer season. Spring season got 80 votes. Which of the following seasons was liked by most people?

(a) Spring season (b) Summer season
(c) Winter season (d) Rainy season

RRB NTPC 29.12.2020 (Shift-II) Stage Ist

Ans. (c) : Total number of votes = 463
Rainy season got votes = 130
Summer season got votes = 100
Winter season got votes = Summer season got votes + 53
= 100 + 53 = 153
Spring season got votes = 80
Hence, it is clear that, 'winter season' was liked by most the people.

16. In a game Rajesh lost $\frac{1}{3}$ of his money in the first round of the game, in the second round he losses $\frac{3}{5}$ of his remaining money and in the third round he lost $\frac{4}{7}$ of the rest. He is left with what part of the original sum of money.

(a) $\frac{4}{15}$ (b) $\frac{4}{45}$ (c) $\frac{2}{5}$ (d) $\frac{4}{35}$

RRB NTPC 30.12.2020 (Shift-I) Stage Ist

Ans. (d) : L.C.M. of 3, 5, 7 = 105 (which is original part)

According to the question-

Amount lost in the first round = $\frac{1}{3}$ part of the total

$$\text{amount} = 105 \times \frac{1}{3} = 35$$

Remaining amount after the first round = $105 - 35 = 70$

Amount lost in the second round = $\frac{3}{5}$ part of the

$$\text{remaining amount} = 70 \times \frac{3}{5} = 42$$

Remaining amount after the second round = $70 - 42 = 28$

Amount lost in the third round = $\frac{4}{7}$ part of the remaining

$$\text{amount} = 28 \times \frac{4}{7} = 16$$

Remaining amount after the third round = $28 - 16 = 12$

$$\text{Hence, remaining share of original amount} = \frac{12}{105} = \frac{4}{35}$$

17. If $f(x) = \frac{x+1}{x-1}$ find the value of $f(f(f(2)))$

(a) 2 (b) 1 (c) -1 (d) 3

RRB NTPC 12.01.2021 (Shift-II) Stage Ist

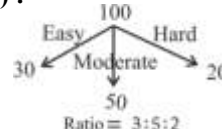
Ans. (d) : $f(x) = \frac{x+1}{x-1}$
 $f(2) = \frac{2+1}{2-1} = \frac{3}{1} = 3$
 $f(f(2)) = \frac{3+1}{3-1} = \frac{4}{2} = 2$
 $f(f(f(2))) = \frac{2+1}{2-1} = 3$

18. There are 100 questions in which each right answer has 1 mark credit. Out of 100 questions 30, 50 and 20 questions are easy, medium and difficult respectively. The questions paper covers five abilities with an equal number of questions and similar distribution of difficulty levels for each ability. Sachin has excellent knowledge in three abilities but in the other two abilities he can solve only easy questions. If the evaluator deducts 0.33 marks for each wrong answer and Sachin attempts all questions which of the following would be his expected score?

(a) 62.60 (b) 62.49 (c) 62.67 (d) 62.98

RRB NTPC 16.01.2021 (Shift-II) Stage Ist

Ans. (c) :



According to the question,

Section	Easy	Moderate	Hard
20	6	10	4
20	6	10	4
20	6	10	4
20	6	10	4
20	6	10	4

Total question solved by Sachin in three sections = $(6 + 10 + 4) \times 3 = 60$

Again, the rest easy questions = $6 + 6 = 12$

Total number of question solved by Sachin = $60 + 12 = 72$

Questions with wrong answer = $10 \times 2 + 4 \times 2 = 28$

$$\text{Expected score} = 72 - \frac{28}{3} = 62.67$$

19. If $a^2 + b^2 + c^2 + d^2 = 1$, what will be the maximum value of the product abcd?

(a) 16 (b) 64 (c) $\frac{1}{64}$ (d) $\frac{1}{16}$

RRB NTPC 04.02.2021 (Shift-II) Stage Ist

Ans. (d) : $a^2 + b^2 + c^2 + d^2 = 1$

For maximum value, $a = b = c = d$

$$\text{Then, } 4a^2 = 1 \Rightarrow a^2 = \frac{1}{4} \text{ or } a = \frac{1}{2}$$

$$\therefore (abcd)_{\max} = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$$

20. In a swimming pool measuring 90 m × 40 m, 150 men take a dip. If the average displacement of water by a man is 8 m³, then what will be the rise in the water level of the pool?

(a) 20 cm (b) 25 cm
(c) 33.33 cm (d) 30 cm

RRB NTPC 10.02.2021 (Shift-II) Stage Ist

Ans. (c) : Volume of water displaced by one man = 8 m³
Total volume of water displaced by 150 men = $8 \times 150 = 1200 \text{ m}^3$

∴ Rise in water level

$$= \frac{\text{Total volume of water displaced}}{\text{Area of the base of the pool}}$$

$$= \frac{1200}{90 \times 40} = \frac{1}{3} \text{ m}$$

$$= \frac{100}{3} \text{ cm} = 33.33 \text{ cm}$$

∴ Rise in water level = 33.33 cm

21. Sundari, Kasu and Joyti each took two tests. The ratio of marks obtained to total marks for each of their two tests is given below;

$$\text{Sundari} - \frac{24}{60} \text{ and } \frac{32}{40}$$

$$\text{Kasu} - \frac{35}{70} \text{ and } \frac{54}{60}$$

$$\text{Joyti} - \frac{27}{90} \text{ and } \frac{45}{50}$$

Who among them registered the maximum progress?

- (a) Both Sundari and Kasu
(b) Only Sundari
(c) Only Joyti
(d) Only Kasu

RRB NTPC 17.02.2021 (Shift-II) Stage Ist

Ans. (c) : Progress of Sundari = $(80 - 40)\% = 40\%$
Progress of Kasu = $(90 - 50)\% = 40\%$
Progress of Joyti = $(90 - 30)\% = 60\%$
Hence, it is clear that Joyti registered the maximum progress.

22. What would be the highest value of X in the given equation?

$$5Y6 + 6X7 + 3Z8 = 1511$$

- (a) 6 (b) 5
(c) 7 (d) 9

RRB NTPC 15.03.2021 (Shift-I) Stage Ist

Ans. (d) Equation = $5Y6 + 6X7 + 3Z8 = 1511$

$$\begin{array}{r} 5Y6 \\ + 6X7 \\ + 3Z8 \\ \hline 1511 \end{array}$$

∴ Y + X + Z = 9, Maximum value of X = 9
So, the value of Y and Z will be 0

23. 250 grams of sweet has 20 grams of Cashew and 30 grams of Almonds. How many grams of this sweet will be 350 grams of Cashew and Almonds respectively.

- (a) 28 and 42 (b) 21 and 28
(c) 40 and 60 (d) 25 and 45

RRB NTPC 19.01.2017 Shift : 2

Ans : (a) % of Cashew in 250 grams sweet

$$= \frac{20}{250} \times 100 = 8\%$$

$$\text{\% of Almond in 250 grams sweet} = \frac{30}{250} \times 100 = 12\%$$

According to the question,

Quantity of Cashew in 350 grams sweet

$$= 350 \times \frac{8}{100} = 28 \text{ grams}$$

Quantity of Almond in 350 grams sweet

$$= 350 \times \frac{12}{100} = 42 \text{ grams}$$

24. Read the following and answer the question based on it. Puspa wanted to buy three shirts. He came to know of the following offers.

1. Super sale Take 2 shirts at a price of Rs. 749 per shirt and get 30% off on the next shirt.
2. Hot sale : Take 2 shirts at a price of Rs. 799 per shirt and get a discount of 40% on the next shirt.
3. Mega sale : Take 2 shirts of Rs. 1999 and get 1 shirt free.
4. Big sale : Take 2 shirts at the cost of Rs. 999 per shirt and get a discount of 90% on the next shirt.

In the content of price which offer is best which Puspa should choose.

- (a) big sale (b) mega sale
(c) super sale (d) hot sale

RRB NTPC 26.04.2016 Shift : 1

Ans : (b) From question,

- (1) Cost of 3 shirts according to the super sale

$$= 749 + 749 + \left(749 \times \frac{70}{100}\right) = \text{Rs. } 2022.3$$

- (2) Cost of 3 shirts according to the hot sale

$$= 799 + 799 + \left(799 \times \frac{60}{100}\right) = \text{Rs. } 2077.4$$

- (3) Cost of 3 shirts according to mega sale

$$= 1999 + 0 = \text{Rs. } 1999$$

- (4) Cost of 3 shirts according to big sale =

$$= 999 + 999 + \frac{999 \times 10}{100} = \text{Rs. } 2097.9$$

Therefore, the best offer is at mega sale which Puspa should choose.

25. A monkey is climb on a 12 m long tree. If he climbs 2 m in first second and in next second he slip 1 m. He repeated this activity again and again. In which second he climbs on the top of tree.

- (a) 20 th (b) 21 st
(c) 22 nd (d) 24 th

RRB NTPC 29.04.2016 Shift : 3

Ans. (b) ∴ The monkey climbs 2 m in first second but next second he slips 1 m. So, he climbs only one meter in 2 seconds.

∴ He will climb 10 meters in 20 seconds and in 21 second he will be able to climb 12 m. It means that he will reach at the top.

26. A man climbs a 24 meters high palm tree. He climbs 4 metres in the first second and slips 2 metres in the next second. This process is repeated again and again until he does not reaches the top. In which second he will at the top?

- (a) 20 th (b) 21 th
(c) 22 th (d) 24 th

RRB NTPC 30.04.2016 Shift : 1

Ans : (b) In 2 seconds the distance climbed at the palm tree = 2 m

Distance climbed at the palm tree in 20 second = 20 m

21st second means the distance climbed at the palm tree in the last = $20 + 4 = 24$ m

Therefore in 21st second he reaches at the top of 24m palm tree.